

# SHEilds



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**ID1 - Course  
book**

## Unit ID1: Know – workplace health and safety principles (UK)

### Learning outcome 1

You will be able to advise on the types of legislation likely to apply to your organisation and how enforcement actions could apply; the relevance of the International Labour Organisation's conventions/recommendations to the organisation; how non-government bodies and standards could influence health and safety in the organisation.

### 1.1: Socio-legal models

#### The role, function, and limitations of legislation as a means of promoting positive health and safety outcomes

The role of health and safety law and legislation is to "encourage" organisations to protect employees, and others, in the workplace. It does this by laying down minimum standards to be implemented by organisations for the protection of people in the workplace. Whilst complying with the law is a minimum requirement in many states, many organisations choose to work to higher standards in the belief that health and safety excellence contributes to profitability.

Legislation helps improve health and safety in the workplace by:

- Setting minimum standards of safety management.
- Creating a national regulator to enforce these standards.
- Providing sufficient numbers of trained inspectors to inspect workplaces and enforce the legislation.
- Giving employers clear direction on what standards must be complied with, therefore helping them reduce injuries and cases of occupational illness.
- Provides a framework for the punishment of non-compliance with the standards.
- Applies to all workplaces, therefore should create a level playing field for all organisations.
- Prescriptive legislation (to be discussed shortly) provides specific rules that must be followed. This is very easy for employers to understand and interpret.
- Goal-setting legislation (also to be discussed shortly) sets out the goals to be achieved, allowing the organisation some flexibility on how they achieve these.

A key limitation of legislation is, that in order for it to be effective, it must be enforced. This is best done by establishing a separate agency to monitor, advise on, and enforce the legislation. Examples of such agencies include the Health and Safety Executive (HSE) in the UK and the Occupational Safety and Health Administration (OSHA) in the USA. These enforcement agencies must be created and funded by the government and given sufficient powers to fulfil their role. Without sufficient funding and power these agencies will not be able to improve health and safety standards.

Article 4 of the ILO Promotional Framework for Occupational Safety and Health Convention C187 requires each country to create a national system for health and safety. This included the need for:

*"Mechanisms for ensuring compliance with national laws and regulations, including systems of inspection."*

Other common limitations include:

- Legislation is outdated and doesn't address the social, economic, and technological changes that can take place very quickly.

- When legislation and standards address only specific categories of workplace (such as factories and construction) many workers are left unprotected.
- Limited penalties are available for organisations who break the law, or penalties are miniscule compared to the organisations' profits.
- Unions and workers are not always involved in the legislation and standard setting process.
- Much of the legislation deals with industrial safety and not occupational health.

## **What are 'goal-setting' and 'prescriptive' legal models? Advantages and disadvantages of each**

'Goal-based regulation' does not specify the means of achieving compliance but sets goals that allow alternative ways of achieving compliance, e.g. "People shall be prevented from falling over the edge of the cliff". In 'prescriptive regulation' the specific means of achieving compliance is mandated, e.g. "You shall install a 1-metre-high rail at the edge of the cliff".

### **Goal Setting Legislation:**

This allows flexibility in health and safety, allowing those responsible to use their knowledge of their activities to design the best controls for hazards. The goal setting 'model' involves legislation that sets the goals to be achieved by the organisation but leaves the organisation to decide on how best to achieve that goal. A good example is the UK's Health and Safety at Work, etc. Act. Section 2.1 of the Act requires employers to:

"Ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees."

As you can see, the wording is deliberately vague. The Act does not define what is meant by "reasonably practicable" or specify exactly how compliance is to be achieved.

This accommodates changing technology and improvements in control methods far more effectively than prescriptive regulations, which would require frequent updating to reflect changing industries and developing technologies.

The requirement for risk assessment under goal-setting regulations ideally promotes greater understanding, by the organisation, of hazards and the controls required to control them, than following prescriptive rules.

The main advantages/benefits of goal-setting legislation include:

- More flexibility in the way compliance may be achieved.
- It is related to the actual risks and can apply to a wide variety of workplaces.
- Much less likely to become out of date.

The main disadvantages/limitations with goal setting legislation are:

- Organisations may not realise what is expected of them because the legislation may be open to wide interpretation.
- The duties it creates, and standards required may be unclear until tested in a court of law.
- Can be difficult to enforce due to the differences in interpretation. The enforcement agency can argue that there is non-compliance, and the organisation can argue it has complied. The court would have to decide.
- Can require high levels of expertise to understand, interpret and advise on how to comply.

### **Prescriptive Legislation:**

In a prescriptive regime the legislation lays down specific actions which must be taken to comply with the legislation.

For example, the UK Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 require:

*" Lifting equipment for lifting persons, or an accessory for lifting, to be examined at least every 6 months, and in the case of other lifting equipment at least every 12 months."*

Whilst the regulation does not explain what is to be included in an examination or what is an accessory, it does prescribe a 6 or 12 month maximum gap between inspections, depending on the equipment.

Compliance with this legislation would involve meeting all the rules but no more.

The main advantages/benefits of prescriptive legislation include:

- Makes the legal requirements clear and explicit.
- Relatively easy for enforcement agencies to determine compliance.
- Also, very easy for organisations to understand what is expected of them.
- Does not require a high level of expertise to understand.

The main disadvantages/limitations include:

- Extensive research required by those who draft and write the legislation. They must try to anticipate all practical situations.
- Time consuming consultation when aimed at specific industries.
- May be necessary to amend more frequently as it becomes outdated.
- Very inflexible.
- Sometimes the requirements can be inappropriate by requiring too high or low a standard. Compliance must be achieved but, in some situations, may not improve safety. Alternatively, compliance can be achieved, but the situation is still unsafe.
- Does not take into account local risks.
- Can stifle innovation because new technologies or practices may be technically non-compliant, but safe and effective.

### **Legal Hierarchy of State and Federal laws, and their application to health and safety law**

The usage of the term 'State' rather than 'nation' or 'country' is to refer unambiguously to the legal government of a territory, rather than to its people or culture. In most cases countries are unitary (for example: Sweden, South Africa, and Singapore) and have just one legal system and therefore, no problem arising with conflict.

Other countries (such as the USA and Australia) adopt the Federal approach, whereby two or more levels of government (State and Federal) exist within an established geographic territory. This is because these countries are composed of individual States (such as Texas, California, and Queensland, etc.) and the States are joined together in a 'Federation'. Each State has its local State Government which creates State Law, only applicable to that particular State. The larger Federation has a Federal Government, which creates Federal Law, applicable to all States that belong to the Federation.

Federal laws are created to deal with matters that affect all the States.



Where there is conflict, Federal law generally takes precedence over individual State Law. States are not permitted to create a law which is in conflict with Federal laws.

A form of Federal law exists within the European Union (EU) whereby members are subject to EU laws (health and safety included) which have precedence over existing legislation of the member State. These appear as a Directive which member States are required to implement into its own legislative system.

In the United States, the US Congress passed the Occupational Safety and Health Act, in order to "*assure as far as possible every working man and woman in the Nation safe and healthful working conditions*". As a federal law the Act applies to all States. To administer the Act a new division was created - the Occupational Safety and Health Administration (OSHA). The head of OSHA (the Assistant Secretary for Occupational Safety and Health) is appointed directly by the President.

## **Loss Events and Compensatory Mechanisms**

### **Introduction**

If workers suffer injury, ill health, or contract a disease, as a result of their work, they may be entitled to some form of compensation (i.e., for their pain and suffering and/or loss of income).

There are several compensation mechanisms available for this process to take place. Some require the worker to use the court systems to show that their loss was as a result of the fault of another person (for example, their employer). In such cases, the worker must demonstrate that his loss was as a result of the employer failing in his duty of care towards the worker. Such claims are called 'fault liability'.

Mechanisms that do not require the worker to show a failure in the duty of care, are called 'no fault liability'.

Coverage for injured workers (including cover for occupational disease) is provided on a no-fault basis in nearly all countries, the UK being a notable exception.

### **Fault Liability**

This system puts the onus on the worker to prove, in a court, that the injury, illness or disease suffered, was caused as a result of the negligence caused by another party, in this case the employer.

Negligence involves proving that the employer failed in his duty of care towards the worker. This involves demonstrating that the employer owed the worker a duty of care; the defendant failed in their duty of care; the worker suffered a loss as a result of that failure. If successful, the worker will be entitled to compensation. This includes pain and suffering incurred, cost of any treatments and loss of earnings. In cases where there is a 'shared' fault (i.e., contributory negligence, where the worker was partly at fault) this can be taken into account in any compensation awarded. In other words, the compensation may be reduced according to the amount the worker contributed to his/her loss.

Compensation is often covered by insurance companies. For example, in the UK employers must have Employers' Liability Insurance, to cover their employees in the event of workplace accidents. In such cases, it is the insurer that handles the compensation claim, often choosing to settle the claim out of court to avoid a time consuming, costly court case. Organisations that settle the claims too easily and quickly often find that this encourages other employees to make claims against them, encouraging a claims culture.

The limitations of fault liability systems include:

- Can be very costly to defend cases.
- "No Win, No Fee" systems can encourage petty claims, at no risk to the claimant.
- Tendency to settle cases early to minimise cost, even if there is no or limited fault.
- Conflictual by nature. Can cause resentment against claimants.
- Very slow to proceed to court if the case is defended.

## **No Fault Liability**

The 'no fault' principle asserts that a person (employer) who causes loss or damage to another by his or her fault should be required to compensate that person, without having to prove negligence. Many countries (including US, Canada, Australia, New Zealand, and Finland) now have no fault (or 'strict') liability schemes.

In 1972 New Zealand adopted a government-funded system for compensating people for accidents or personal injuries (operated by the Accident Compensation Corporation, or ACC), replacing its former negligence-based system. A generation of New Zealanders has now grown up knowing the ACC as the primary method of dealing with personal injury claims, and avoidance of litigation is widely regarded as a social gain. Reforms in 2005 removed the final fault element from the compensation criteria for medical injuries, making it a true no fault scheme.

The UK government operates an Industrial Injuries Disablement Scheme (a form of no-fault liability), whereby workers who are disabled because of an accident at work, or who have certain diseases caused by their work, can claim a weekly benefit.

Benefits of no-fault liability include:

- More cost effective and quicker.
- More consistency in damages.
- Outcome is fairer ('fault' systems often fail because of failure to prove fault).

Limitations include:

- May result in employers with higher injury rates having to pay more into a no-fault system.
- Could encourage more people to apply for compensation and create a claim culture.

## **Damages**

### **Introduction**

In personal injury cases, 'damages' is a term that refers to the amount of money awarded to the injured party (or plaintiff) who suffered harm due to the negligent, reckless, or intentional action of the defendant. Damages can be grouped as either general or special - also commonly referred to as non-economic and economic damages.

### **General Damages**

General damages compensate the claimant for the non-monetary aspects of the specific harm suffered. This is usually termed "pain, suffering and loss of amenity". Examples of this include physical or emotional pain and suffering, loss of companionship, disfigurement, loss of reputation, loss, or impairment of mental or physical capacity, loss of enjoyment of life (inability to continue hobbies, activities, sports, etc.). This is not easily quantifiable

and depends on the individual circumstances of the claimant. Judges in the United Kingdom base the amount of damages awarded on similar previous cases.

General damages are generally awarded only in claims brought by individuals when they have suffered personal harm. This includes personal injury at work as a result of the negligence of an employer.

### **Special Damages**

Special damages financially compensate the injured person for losses suffered due to the defendant's actions. Special damages are out-of-pocket expenses that can be determined by adding together all the plaintiff's quantifiable financial losses. Special damages include loss of wages, earning capacity, damage to equipment, belongings, and medical expenses (past and future).

### **Punitive Damages**

Punitive damages or exemplary damages are damages intended to reform or deter the defendant and others from engaging in conduct similar to that which formed the basis of the lawsuit. Although the purpose of punitive damages is not to compensate, the plaintiff will receive all or some portion of the punitive damage award.

Punitive damages are often awarded where compensatory damages are deemed an inadequate remedy. The court may impose them to prevent under-compensation of plaintiffs.

Punitive damages are most important for violations of the law that are hard to detect. However, punitive damages awarded under court systems that recognise them may be difficult to enforce in jurisdictions that do not recognise them. For example, punitive damages awarded to one party in a US case would be difficult to get recognition for in a European court, where punitive damages are most likely to be considered to violate "order public".

Because they are usually paid in excess of the plaintiff's provable injuries, punitive damages are awarded only in special cases, where the defendant's conduct was extremely serious (outrageous misconduct).

## 1.2: Enforcement

### The Purpose of Enforcement

The purpose of enforcement is to ensure that duty holders:

- Deal immediately with serious workplace risks.
- Comply with the law.
- Are held accountable if they fail in their responsibilities.

Practical enforcement measures can include:

- Providing advice and guidance to the organisation and individuals.
- Issuing notices (such as improvement or prohibition notices).
- Imposing a financial penalty (fine) and/or a custodial sentence (imprisonment).
- Imposing an order upon the organisation which requires them to take an action. For example, a publicity order requires the organisation to publicise their breach of legislation in the media.

The International Labour Organisation (ILO) health and safety convention C155 sets out broad requirements for member countries to follow to ensure health and safety requirements are enacted into national laws and enforced. Article 9 states:

*"The enforcement of laws and regulations concerning occupational safety and health and the working environment shall be secured by an adequate and appropriate system of inspection, AND the enforcement system shall provide for adequate penalties for violations of the laws and regulations."*

### The Principles of Enforcement

The UK HSE have issued the *"HSE Enforcement policy statement" (HSE 41)*. This policy statement sets out the HSE approach to enforcement, that is, where HSE inspectors take action to enforce the law when issues of non-compliance or serious risk have been identified.

In addition to providing published information and verbal advice, the enforcement methods available to HSE inspectors include:

- Providing written information regarding breaches of law.
- Requiring improvements in the way risks are managed.
- Stopping certain activities where they create serious risks.
- Recommending and bringing prosecutions where there has been a serious breach of law.

### Proportionality of Enforcement

Enforcement action should be proportionate to the health and safety risks and to the seriousness of any breach of the law. This includes any actual or potential harm arising from any breach, and the economic impact of the action taken. In turn, duty holders (such as employers) should adopt a sensible and proportionate approach to managing health and safety, focusing on significant risks (i.e., those with the potential to cause real harm).

Some risks which cannot be reduced, particularly in the major hazard sectors (for example: certain offshore installations, certain pipelines, biological agent facilities, etc.) may be so serious that they cannot be permitted regardless of the consequences.



## **Consistency of Approach**

Consistency of approach does not mean solving all problems in the same way. It means taking a similar approach in similar circumstances to achieve compliance with the law.

People managing similar risks in similar industries expect a consistent approach from enforcement inspectors when taking enforcement action. However, consistency is not a simple matter. Every situation is different - by virtue of the industry, workplace, its risks, management systems, etc. As a result, inspectors are faced with many variables in addition to the degree of risk and the seriousness of any breach, including the attitude and competence of management, incident history and previous enforcement action. Any enforcement decision therefore requires the appropriate exercise of individual discretion and professional judgement.

## **Transparency**

Enforcement action should clearly outline to duty holders not only what they have to do but, where relevant, what they don't. Where non-compliance has been identified, inspectors should clearly and promptly explain the decision taken, their reasons, and the actions required to achieve compliance. They will discuss reasonable timescales with the duty holder and explain what will happen if they fail to comply.

Additionally, inspectors should differentiate between the actions required to comply with the law, and advice given to achieve good practice or inform of upcoming changes to legal requirements. This should ensure that unnecessary financial burdens are not imposed on businesses.

Transparency also involves keeping employees, employee representatives, injured persons and their families informed of relevant enforcement action. However, this is subject to legal constraints on confidentiality.

## **Examples of Enforcement Agencies**

In the UK, the [Health and Safety Executive \(HSE\)](#) enforces health and legislation under powers granted under the Health and Safety at Work, etc. Act 1974.

In the US, within the Occupational Safety and Health Act of 1970, Congress created the [Occupational Safety and Health Administration \(OSHA\)](#) to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance.

### 1.3: The International labour Organisation (ILO) and its conventions and recommendations

Founded in 1945, The United Nations (UN) is an intergovernmental organisation promoting international cooperation. The organisation was established in 1945 after World War II in order to prevent another such conflict. There are now 193 member states. Each member state sits on the General Assembly, which is the main forum where issues are discussed.

The UN objectives include:

- Maintaining international peace and security.
- Promoting human rights.
- Fostering social and economic development.
- Protecting the environment.
- Providing humanitarian aid in cases of famine, natural disaster, and armed conflict.

#### The Role of the International Labour organisation (ILO)

Founded in 1919, the ILO is a United Nations agency dealing with labour issues, particularly international labour standards, social protection, and work opportunities for all. The ILO has 187 member states.

The ILO's primary goal is to promote opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and dignity. In this context the protection of workers against work-related sickness, disease and injury, as embodied in the Constitution of the ILO, is an essential element of security and continues to be a high priority for the ILO.

Concern for occupational safety and health is a major part of the ILO's four strategic objectives:

1. Setting and promoting standards and fundamental principles and rights at work.
2. Creating greater opportunities for women and men to gain decent employment and income.
3. Enhancing the coverage and effectiveness of social protection for all.
4. Strengthening [tripartism](#) and social dialogue.

The ILO can influence health and safety standards in the workplace in different countries by:

- Creating International Labour Standards such as Conventions. These conventions can be ratified by member states, who must then implement the standards in their own national legislation.
- Issuing Recommendations which provide further detail on the requirements of the Conventions.
- Monitoring countries' efforts to implement the treaty standards and requiring them to report on their progress regularly.
- Providing technical assistance to member states when requested.
- Investigating complaints against member states for non-compliance with International Labour Standards.
- By pursuing and promoting the ILO Decent Work Agenda, which aims to improve employment creation, social protection, rights at work, and social dialogue.
- By applying international pressure to adopt ILO standards.
- By working with human rights groups in member states to raise awareness of issues.

## **The International Labour Conference**

The International Labour Conference (also known as the parliament of labour) is a yearly event, held each June in Geneva and is hosted by the ILO.

Member states are represented at the conference by four delegates: two government delegates, an employer delegate, and a worker delegate. All delegates have individual voting rights, and all votes are equal, regardless of the population of the delegate's member state. The employer and worker delegates are normally chosen in agreement with the most representative national organisations of employers and workers. Usually, the worker delegates coordinate their voting, as do the employer delegates.

The conference makes decisions on the organisation's general policy, work programme and budget and creates conventions and recommendations that are adopted by majority decision. Once adopted conventions are then open to ratification by member states.

The Conference will examine reports from governments (all member states are required to submit), detailing their compliance with ratified Conventions. In addition, if requested by the governing body of the ILO, member state governments must submit reports on their law in practice with respect to non-ratified Conventions and Recommendations.

## **Status of ILO Conventions and Recommendations**

The ILO sets out international treaty agreements in the form of Conventions, with member countries confirming their acceptance of the conventions by ratifying them, thus agreeing to be bound by them.

Member countries (in particular, emerging countries with little experience in managing workplace health and safety) are able to use the ILO Conventions to guide their approach to health and safety, especially ILO C155 (Occupational Safety and Health Convention 1981) which sets out the basic duties of employers, employees, and member states.

Additionally, the ILO produces several other documents in support of a Convention, namely Recommendations, Codes of Practice and Guidance.

## **Adoption of Conventions**

One of the principal functions of the ILO involves setting international labour standards. This is achieved through the adoption of Conventions and Recommendations which cover a broad spectrum of labour-related subjects (including safety and health). When all together these Conventions and Recommendations are sometimes referred to as the International Labour Code.

Adoption of a Convention by the International Labour Conference allows governments to ratify it. When a specified number of Governments have ratified it, the Convention then becomes a treaty in international law.

Ratification of a Convention is voluntary. Conventions that have not been ratified by member states have the same legal force as Recommendations. However, when a Convention is ratified by a nation there is a legal obligation to apply its provisions.

A further example of a safety and health Convention is Safety and Health in Construction Convention, 1988 (No.166).

## Recommendations

Recommendations do not have the binding force of Conventions and are not subject to ratification by member countries. Recommendations may be adopted at the same time as Conventions to supplement the Conventions with additional or more detailed provisions. The intent of these recommendations is often to detail the principles of related Conventions more precisely. In other cases, recommendations may be adopted separately, and address issues not covered by, or unrelated to any particular Convention.

An example of a safety and health recommendation is Occupational Safety and Health Recommendation R164, 1981, which provides guidance on how Convention C155 can be met.

## Codes of Practice

Codes of Practice set out practical guidelines for public authorities, employers, workers, and organisations. They are not legally binding and are not intended to replace the provisions of national laws or regulations, or accepted standards. Codes of Practice provide guidance on safety and health at work in certain economic sectors (for example: construction, mines, iron and steel industries, agriculture, ship building and ship repairing, forestry, etc.) and on how to protect workers against certain hazards (for example: machinery, radiation, lasers, visual display units, chemicals, asbestos, airborne substances).

A specific example is: Safety and Health in the use of Machinery, 2013.

## Guidance

These provide more general guidance to a specific area of interest. For example: Guidelines on Occupational Safety and Health Management Systems, ILO-OSH 2001.

## Roles and Responsibilities of International Governments, Enterprises, and Workers

In the following sections we will discuss the role and responsibilities of international governments, enterprises (which we usually refer to as an 'organisation') and workers. This information is based upon a selection of ILO legislation.

- ILO Occupational Safety and Health Convention C155.
- ILO Occupational Safety and Health Recommendation R164.
- ILO Promotional Framework for Occupational Safety and Health Convention C187 and its accompanying Recommendation R197.
- ILO Occupational Health Services Convention C161 and its accompanying Recommendation R171.

*Please note, it is NOT necessary to memorise each and every Article number for exam purposes. NEBOSH will test your understanding of the legislation, not your ability to memorise Article numbers.*

## International Governments - Principles of National Policy

Governments are responsible for drawing up their national occupational health and safety policies and making sure that they are implemented. Policies will be reflected in legislation, and legislation must be enforced. But legislation cannot cover all workplace risks, and it may also be advisable to address occupational safety and health issues by means of collective agreements reached between the social partners (i.e., employers, trade unions, and employees). Policies are more likely to be supported and implemented if employers and workers, through their respective



organisations, participate in writing them. This is regardless of whether they are in the form of laws, regulations, codes, or collective agreements.

Below are excerpts of ILO Occupational Safety and Health Convention C155, which details the key responsibilities of member countries, together with any further detail given by ILO Occupational Safety and Health Recommendation R164.

#### **Article 4 of C155**

"Each Member shall, in the light of national conditions and practice, and in consultation with the most representative organisations of employers and workers, formulate, implement and periodically review a coherent national policy on occupational safety, occupational health and the working environment."

Article 3 of the ILO Promotional Framework for Occupational Safety and Health Convention C187 sets out additional requirements with regards to the national policy, namely:

- "Each Member shall promote a safe and healthy working environment by formulating a national policy."
- "Each Member shall promote and advance, at all relevant levels, the right of workers to a safe and healthy working environment."
- "In formulating its national policy, each Member, in light of national conditions and practice and in consultation with the most representative organizations of employers and workers, shall promote basic principles such as assessing occupational risks or hazards; combating occupational risks or hazards at source; and developing a national preventative safety and health culture that includes information, consultation and training."
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ILO Recommendation 164 (Paragraph 3) indicates the scope of the "technical fields of action" that should be considered when implementing the national policy, including:

- Design, siting, structural features, installation, maintenance, repair, and alteration of workplaces and means of access thereto and egress there from.
- Lighting, ventilation, order, and cleanliness of workplaces.
- Temperature, humidity, and movement of air in the workplace.
- Prevention of harmful physical or mental stress due to conditions of work.
- Use of electricity.
- Manufacture, packing, labelling, transport, storage and use of dangerous substances and agents, disposal of their wastes and residues, and, as appropriate, their replacement by other substances or agents which are not dangerous, or which are less dangerous.
- Radiation protection.
- Prevention and control of, and protection against, occupational hazards due to noise and vibration.
- Design, manufacture, supply, use, maintenance and testing of personal protective equipment and protective clothing.
- Sanitary installations, washing facilities, facilities for changing and storing clothes, supply of drinking water, and any other welfare facilities connected with occupational safety and health.
- First-aid treatment.
- Establishment of emergency plans.

Paragraph 4 of R164 states that to give effect to the national policy, each country should:

- Issue or approve regulations, codes of practice or other suitable provisions on occupational safety and health and the working environment, account being taken of the links existing between safety and health, on the one hand, and hours of work and rest breaks, on the other.
- From time to time review legislative enactments concerning occupational safety and health and the working environment, and provisions issued or approved in pursuance of the above paragraph, in the light of experience and advances in science and technology.
- Undertake or promote studies and research to identify hazards and find means of overcoming them.
- Provide information and advice, in an appropriate manner, to employers and workers and promote or facilitate co-operation between them and their organisations, with a view to eliminating hazards or reducing them as far as practicable; where appropriate, a special training programme for migrant workers in their mother tongue should be provided.
- Provide specific measures to prevent catastrophes, and to coordinate and make coherent the actions to be taken at different levels, particularly in industrial zones where undertakings with high potential risks for workers and the surrounding population are situated.
- Secure good liaison with the International Labour Occupational Safety and Health Hazard Alert System set up within the framework of the International Labour Organisation.
- Provide appropriate measures for disabled workers.

### **International Governments - Action at National Level**

Article 8 of C155 requires that members states enact laws or regulations and take steps to implement the National Policy discussed in Article 4.

Article 9 of C155 requires member states to implement adequate and appropriate system of inspection. The enforcement system shall provide for adequate penalties for violations of the laws and regulations.

Article 10 of C155 requires member states to provide guidance to employers and workers so as to help them to comply with legal obligations.

Article 11 of C155 requires member states to:

- Determine which safety standards should govern the design, construction, and layout of organisations, how they are majorly altered, and the safety of technical equipment.
- Determine which work processes, substances, and agents which should be prohibited, limited, or be subject to authorisation or control by the government.
- Establish procedures for the notification of work-related accidents and diseases, by employers in order to compile national statistics on these.
- Hold inquiries in cases of serious work-related accidents, disasters, or diseases.
- Publish annually information on measures taken in pursuance of the policy referred to in Article 4.

Article 12 of C155 requires member states to ensure that those who design, manufacture, import, provide or transfer machinery, equipment, or substances for occupational use:

- Ensure the machinery, equipment or substance does not entail dangers for the safety and health of those using it correctly.
- Make available information concerning:
  - The correct installation and use of machinery and equipment.

- The correct use of substances.
- Information on hazards of machinery and equipment.
- Dangerous properties of chemical substances and physical and biological agents or products.
- Instructions on how known hazards are to be avoided.

Article 13 requires member states to provide protection from undue consequences to workers who remove themselves from work situations that present an imminent and serious danger to their life or health.

Article 14 requires member states to include any appropriate matters of health and safety at all levels of education and training.

## **Roles and Responsibilities of Enterprises**

Employers and organisations have a responsibility to manage their activities in such a way that protects the health and safety of anyone (employees or others) that might be harmed by the workplace. This means making sure that workers and others are protected from anything that may cause harm, effectively controlling any risks to injury or health that could arise in the workplace.

Employer responsibilities are detailed under Articles 16 to 21 of C155.

Article 16 provides some general responsibilities:

- To ensure that, so far as is reasonably practicable, the workplaces, machinery, equipment, and processes under their control are safe and without risk to health.
- To ensure that, so far as is reasonably practicable, the chemical, physical and biological substances and agents under their control are without risk to health when the appropriate measures of protection are taken.
- To provide, where necessary, adequate protective clothing and protective equipment to prevent, so far as is reasonably practicable, risk of accidents or of adverse effects on health.

Paragraph 10 of R164 provides further details on how this should be achieved and makes the following recommendations to employers:

- To provide and maintain workplaces, machinery, and equipment, and use work methods, which are as safe and without risk to health as is reasonably practicable.
- To give necessary instructions and training, taking account of the functions and capacities of different categories of workers.
- To provide adequate supervision of work and work practices.
- To implement organisational arrangements to manage health and safety that are proportionate to the size and complexity of the organisation, and the nature and level of risk.
- To provide, without any cost to the worker, adequate personal protective clothing and equipment which are necessary when hazards cannot be otherwise prevented or controlled.
- To ensure that work organisation, particularly with respect to hours of work and rest breaks, does not adversely affect occupational safety and health.
- To take all reasonably practicable measures with a view to eliminating excessive physical and mental fatigue.
- To carry out studies and research or otherwise keep up to date of the scientific and technical knowledge necessary to comply with the above.

Article 17 requires cooperation and collaboration between organisations when two or more carry out activities simultaneously in one workplace.

Article 18 requires employers to implement procedures to deal with emergencies and accidents, including first aid arrangements.

Article 19 addresses the rights and responsibilities of workers and their representatives:

- Workers must cooperate with their employer to assist them in complying with their legal obligations.
- Representatives of workers in the organisation must also cooperate with the employer.
- Representatives of workers must be given adequate information on health and safety measures taken by the employer. They may consult their representative organisations about such information, provided they do not disclose commercial secrets.
- Workers and their representatives must be given appropriate training in health and safety.
- Workers or their representatives must be consulted by the employer on all aspects of health and safety associated with their work.
- Workers must report to their immediate supervisor any situation which they believe presents an imminent and serious danger to their life or health. Until the employer has taken remedial action, if necessary, the employer cannot require workers to return to a work situation where there is continuing imminent and serious danger to life or health.

Article 20 requires cooperation between management, workers, and the workers' representatives in pursuit of compliance of Articles 16 to 19.

Paragraph 12 of R164 recommends that, to facilitate the cooperation required by Article 20, employers should appoint people to represent workers and appoint health and safety committees. These committees should have equal representation of worker and management representatives.

Representatives should:

- Be given adequate information on health and safety matters and be encouraged to propose measures to improve worker protection.
- Be consulted when major new safety and health measures are considered and before they are carried out and seek to obtain the support of the workers for these measures.
- Be consulted in planning alterations of work processes, work content or organisation of work, which may have safety or health implications for the workers.
- Be given protection from dismissal and other official or unofficial punishment while exercising their functions as workers' representatives or as members of safety and health committees.
- Be able to contribute to the decision-making process regarding matters of safety and health.
- Have access to all parts of the workplace and be able to communicate with the workers on safety and health matters during working hours at the workplace.
- Be free to contact labour inspectors.
- Be able to contribute to negotiations in the organisation on occupational safety and health matters.
- Have reasonable time during paid working hours to exercise their safety and health functions and to receive training related to these functions.
- Have recourse to specialists to advise on particular safety and health problems.

Article 21 requires employers not to charge the workers any money for any health and safety measures.



## **Roles and Responsibilities of Workers**

Workers have a duty to take care of their own health and safety and that of others who may be affected by their work. They must also cooperate with employers and co-workers to help maintain a safe and healthy workplace, and to ensure everyone meets their legal requirements.

Employee responsibilities were briefly discussed in the previous section. According to Articles 19 and 20 of C155:

- Workers must cooperate with their employer to assist them to comply with their legal obligations.
- Representatives of workers must cooperate with the employer in the field of occupational safety and health.
- Workers will report instantly to their immediate supervisor any situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health.

Paragraph 16 of R164 provides further recommendations. Workers should:

- Take reasonable care for their own safety and that of other persons who may be affected by their acts or omissions at work.
- Comply with instructions given for their own safety and health and those of others.
- Comply with safety and health procedures.
- Use safety devices and protective equipment correctly and do not render them inoperative.
- Report to their immediate supervisor any situation which they have reason to believe could present a hazard and which they cannot themselves correct.
- Report any accident or injury to health which happens during or in connection with work.

## **International Conventions as the Basis for International Health and Safety Legislation**

ILO standards have exerted considerable influence on the laws and regulations of member states in that many laws have been modelled on the relevant requirements of ILO Conventions and Recommendations. Drafts of new legislation or amendments are often prepared with ILO standards in mind so as to ensure compliance with ratified Conventions or to permit the ratification of other Conventions. This is particularly useful for emerging countries who can be inexperienced in managing health and safety, who can use the Conventions and Recommendations to shape their health and safety legislative systems.

Indeed, governments frequently consult the ILO, both formally and informally, about the compatibility of proposed legislative texts with international labour standards.

The ILO policy on occupational safety and health is essentially contained in three international labour Conventions and their accompanying Recommendations.

### **The Promotional Framework for Occupational Safety and Health Convention C187, and its accompanying Recommendation R197.**

These provide for the establishment of a permanent process of continuous improvement of occupational safety and health and the building of a preventive safety and health culture. This requires governments, in consultation with the most representative organisations of employers and workers, to take active steps towards achieving progressively and maintaining a safe and healthy working environment by elaborating or updating a national policy, developing, or upgrading a national system and implementing national programmes on occupational safety and health. This process must take into account the principles set out in the instruments of the ILO relevant to the Convention and must include a mechanism to consider what measures could be taken to ratify OSH-related ILO Conventions.

**The ILO Occupational Safety and Health Convention C155, and its accompanying Recommendation R164.**

These provide for the adoption of a national occupational safety and health policy, as well as describing the actions to be taken by governments and within enterprises to promote occupational safety and health and improve the working environment. The Convention is supplemented by the [Protocol of 2002](#) to the Occupational Safety and Health Convention (No. 155), which calls for the establishment and periodic review of requirements and procedures for the recording and notification of occupational accidents and diseases, and for the publication of related annual statistics.

**The ILO Occupational Health Services Convention C161 and its accompanying Recommendation R171.**

These provide for the establishment of occupational health services at the enterprise level, designed to ensure the implementation of health surveillance systems and to contribute towards implementing the OSH policy.

## **1.4: Non-Governmental Bodies and health and safety standards**

### **Influential Parties and Their Role in Influencing Health and Safety Performance**

#### **Employer Bodies**

Employer bodies play an important role in the consultation process with respect to impending legislation. In the UK, one such body is the Confederation of British Industry (CBI).

The CBI has a 'health and safety forum' which is a specialist body on issues of occupational health, workplace safety, and the legislation that affects business in these areas.

Members, who are drawn from across all sectors of the economy, are consulted about new and existing UK and EU legislation to ensure CBI policies represent the views of the whole business community. The programme of meetings and events provides members with an opportunity to shape some of the latest developments on key health and safety issues as well as to network with other professionals and share best practice.

The International Organisation of Employers (IOE) represents the interests of business in labour and social policy and works closely with the ILO. As of September 2015, it had 153 national employer organisations members in 143 countries. The organisation is also active outside of the ILO and is increasingly engaged in international forums like the G20 meetings, often in collaboration with the Business and Industry Advisory Committee to the OECD. The IOE is also actively involved with the work of the World Health Organisation, the United Nations Environment Programme, the International Organisation for Migration, and the World Bank.

Its aims are to:

- Create economic and social environments favourable to free enterprise and a stable market economy.
- Create an international forum for the interests of national employers' organisations on social and labour policy.
- Provide information and advice to members, organise permanent communications between them, and coordinate employers' interests at an international level.
- Provide support to autonomous employers' organisations.
- Inform public opinion and advance understanding of employers' arguments.
- Allow employers' organisations to share experience, best practice, and information.

#### **Trade Unions**

Trade Unions play a vital role in encouraging employers to adopt good standards of health and safety. Many trade unions have full-time health and safety specialists to assist them (and any elected employee health and safety representatives) in achieving good standards.

The Trades Union Congress (TUC) is a national trade union centre, a federation of trade unions in England and Wales, representing the majority of UK trade unions. There are 54 affiliated unions with a total of about 6.2 million members.

The International Trade Union Confederation is the world's largest trade union federation. It represents 176 million workers through 328 affiliated organisations, in 162 countries. Recently it has campaigned forcefully against perceived slave labour in the Gulf states such as Qatar, Kuwait, and Saudi Arabia.

Trade Unions influence health and safety by:

- Being involved in consultation with enforcement agencies prior to the introduction of new health and safety legislation.
- Participate in working groups with employers and governments to find solutions to problems.
- Lobby government to influence legislation.
- Provide health and safety courses for members (for example: safety representative training).
- Publicise health and safety issues for members.

### **Trade Associations**

A trade association is an organisation that is created and funded by businesses that operate in a specific industry. For example:

- International Chamber of Shipping.
- Confederation of the Food and Drink Industries of the EU.
- European Chemical Industry Council.
- All India Biotech Association.
- Hospitality Association of Namibia.
- The UK's National Access and Scaffolding Confederation.
- International Association of Oil and Gas Producers (IAOGP).
- International Powered Access Federation (IPAF).

An industry trade association participates in public relations activities such as advertising, education, political donations, lobbying and publishing, but its focus is collaboration between companies. Associations may offer other services, such as producing conferences, networking or charitable events or offering classes or educational materials.

Many trade associations influence health and safety performance by:

- Producing industry codes of practice which set out what is considered to be the industry best practice on managing certain hazards and risks. For example, the IAOGP has many codes of practice addressing the safety of oil and gas installations and the associated risks.
- Accrediting or delivering industry training. For example, IPAF deliver training and issue certification in the use of Mobile Elevating Work Equipment.
- Sharing technical and safety information between businesses.
- Providing a forum for industry discussion between members.
- Promoting best practice in design and safety within the industry.

### **Public Opinion and Pressure Groups**

Public opinion can have a powerful effect on legislators. This may result in legislation being passed or amended or, in the event of a major incident, a public inquiry being opened.

For example, the 2012 Dhaka factory fire and the 2013 Rana Plaza collapse in Bangladesh scandalised the nation and triggered protests from other factory workers. The disasters received significant media attention across the world and major corporations such as Walmart, Carrefour and Primark were pressured by their own customers into increasing safety standards throughout their supply chains.

Recent public and media scrutiny in the UK on Sports Direct, a clothing and sport equipment retailer, has resulted in the organisation promising to improve its treatment of workers at its warehouse.



## **Professional Groups**

The Institute of Occupational Safety and Health (IOSH).

Based in the UK, IOSH acts as a champion, supporter, adviser, advocate and trainer for health and safety professionals working in organisations of all sizes. It gives the British health and safety profession a consistent, independent, authoritative voice at the highest levels.

IOSH influence health and safety performance by:

- Petitioning governments for improvements or to raise awareness of issues.
- Advising policymakers at high levels of government.
- Commissioning research and setting standards.
- Running high-profile campaigns to promote awareness of the issues that affect safety, health and wellbeing at work - from the causes of cancer to the hazards of dust, from safeguarding mental health, to achieving a healthy work-life balance.
- Providing accredited and relevant training for employees and managers.
- Running a membership programme for health and safety professionals and admitting experienced and competent professionals as 'Chartered Members'.
- Requiring members to undergo frequent Continuing Professional Development (CPD) so they maintain and improve their skills and knowledge.
- Publishing monthly magazines and newsletters to members, delivering the latest health and safety news and information.

## **American Society of Safety Engineers (ASSE).**

Founded in 1911, the American Society of Safety Engineers (ASSE) is the world's oldest professional safety society. ASSE promotes the expertise, leadership, and commitment of its members, while providing them with professional development, advocacy, and standards development. It also sets the occupational safety, health and environmental community's standards for excellence and ethics.

## **Board of Certified Safety Professionals.**

The Board of Certified Safety Professionals (BCSP) began in 1969 in the U.S. Its sole purpose is to certify professionalism in the safety profession.

According to the BCSP website they:

- Sets standards for professional, technician, technologist, and supervisory level safety practices.
- Evaluates the academic and professional experience qualifications of certification applicants.
- Administers examinations.
- Issues certificates to candidates who meet BCSP's certification qualifications and successfully pass the examination(s).
- Monitors continued professional development through mandatory recertification requirements.

## The Importance of the Media

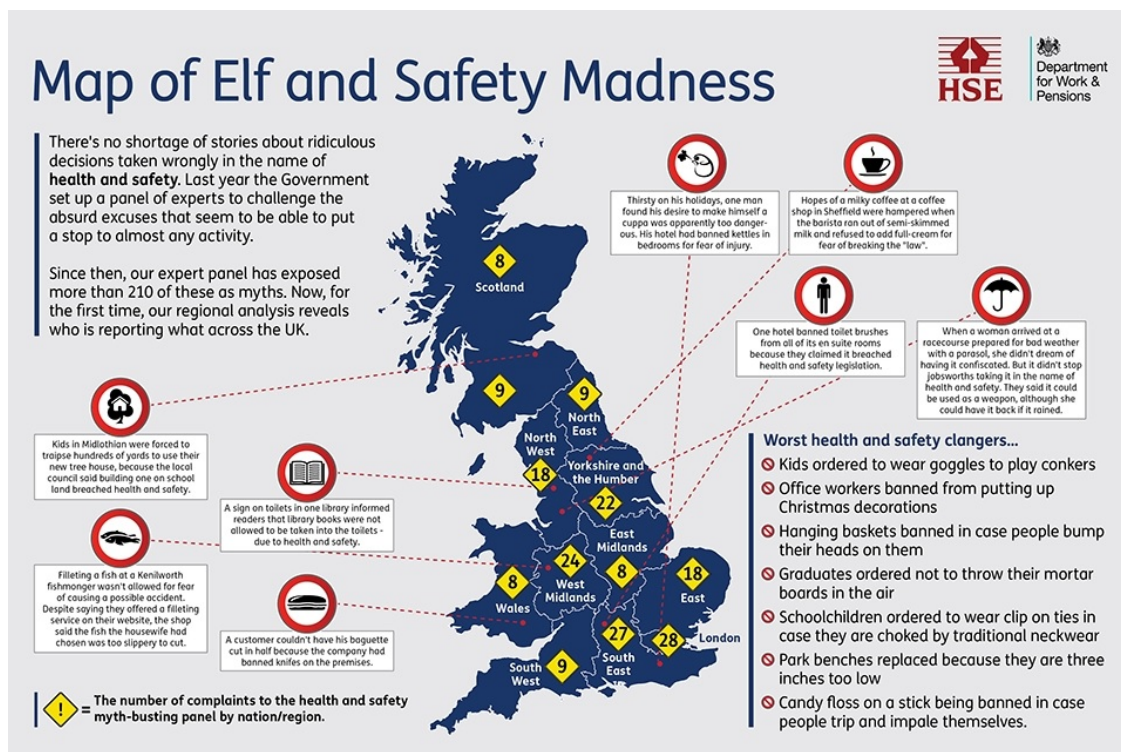
Health and safety at work is not usually considered newsworthy by the media. There are, however, a couple of exceptions:

- When the media publicises, ridiculous decisions supposedly taken in the name of health and safety (also called 'elf and safety' by the UK media).
- After a major accident.

### 'Elf and Safety' Myths.

There's no shortage of stories about ridiculous decisions taken wrongly in the name of health and safety. In 2012, the UK Government set up a panel of experts to challenge the absurd excuses that seem to be able to put a stop to almost any activity. Since then, this Myth Busters panel has exposed more than 400 of these as myths.

The regional analysis below reveals who is reporting what across the UK.



Stories relating to these ridiculous decisions are popular in a print and online media that has become more and more sensationalist over the past decades. Journalists and publications often do not attempt to uncover the real reasons behind such decisions, which are often made for other reasons such as budgetary constraints, poor customer service, technical difficulties, or just organisational preferences.

As a result, the reputation and credibility of the health and safety profession as a whole is tarnished. This can lead to people not paying any importance to very relevant health and safety messages, potentially putting themselves at risk.

## **Major Accidents**

Whenever there is a major accident there is, inevitably, a lot of media attention (e.g., television, radio, newspapers, magazines, and the internet). Incidents such as Piper Alpha (North Sea, UK), Deepwater Horizon (Gulf of Mexico, USA), Bhopal (India) and the Zeebrugge Ferry disaster (Netherlands) were widely reported in the Media.

## **The Positive role of the Media with respect to Health and Safety**

The Media (and in particular the internet) plays an important role in communicating health and safety information and issues globally. Much of this information can be downloaded and used to improve standards and attitudes with respect to health and safety. For example, the HSE in the UK have an extensive library of health and safety publications (such as legislation, codes of practice, guidance notes) on a variety of topics - all freely available. Other international organisations providing free health and safety information and advice include the ILO; the World health organisation (WHO); the US Occupational health and safety administration (OSHA); The European Agency for safety and health at work (EU OSHA); Safe work, Australia and the Canadian Centre for Occupational Health and Safety (CCOHS).

## **Schemes Which Promote Health and Safety Cooperation**

### **Good Neighbour Schemes**

There are many organisations and schemes that involve cooperation on health and safety issues. In particular, schemes whereby larger organisations help smaller organisations, to improve health and safety management or standards, by sharing 'good practice' and, in some cases, resources. An example of this is when a large oil refinery in the UK assisted other smaller surrounding manufacturing companies by providing fire-fighting resources in the event of a serious fire.

Organisations committed to high standards of health and safety performance are able to influence the health and safety standards of other organisations that they come into contact with (e.g., contractors and suppliers).

In 1996 Ireland's Health and Safety Authority (HSA) organised a pilot 'Good Neighbour Scheme' to coincide with the European Health and Safety Week. Fifty large well organised companies, from a health and safety viewpoint, were invited to participate in the pilot scheme. Participating companies organised safety events during the week to which they invited smaller firms associated with them, whether as suppliers, customers, or neighbours. Events ranged from safety talks to first aid demonstrations to a staff quiz on health and safety themes.

In the UK, the Health and Safety Executive (HSE) followed Ireland's lead and started the "good neighbour" scheme whereby large organisations share expertise and training with contractors and suppliers. From 1998 onwards HSE launched a series of Good Neighbour Forums around the country. Under the initiative, five of the biggest organisations in the Northwest set up a partnership offering health and safety expertise to their small contractors, suppliers, and neighbouring businesses.

Within the Construction Industry in the UK, The Considerate Contractors Scheme is a good example of a good neighbour scheme. It is an independent organisation designed to raise standards within the Construction Industry. The scheme is about construction activity that may have a direct or indirect impact on the image of the Construction Industry, for example how it the public might perceive the industry, or another area is the impact the construction scheme has on the surrounding environment.

Good neighbour schemes have been identified as one of the more effective ways of finding and engaging with small organisations. Through these schemes organisations that are committed to achieving high standards of health and

safety can influence other organisations that they come into contact with. This can include contractors, suppliers, local businesses, schools, and the public.

Examples of good neighbour scheme activities have included seminars, face-to-face discussion, training events, quizzes, and offering health and safety expertise.

Engaging in schemes that promote cooperation between organisations encourages an organisation to become open to new methods, ideas, processes, and practices to improve effectiveness, efficiency, and performance. Cooperation can result in organisations asking themselves thought-provoking questions such as:

- How well are we performing compared to other organisations?
- What are the best practices?
- What improvement opportunities should we focus on?

Organisations who cooperate and compare their performance will see the following benefits:

- Increased confidence when unconfirmed assumptions on good performance are confirmed.
- Can help identify safety problems.
- Helps to prioritise possible improvements.
- Can help change the organisation's thinking from "What has gone wrong?" to "What can be done to prevent things going wrong in future?"
- Creates a sense of competitiveness and a desire to improve.
- Challenges employees to work 'smarter' instead of just 'harder'.

### **Supplier Auditing**

Companies that are committed to high standards of health and safety performance can also be encouraged to have procurement systems and standards in place which enable them to avoid purchasing plant, equipment, substances which pose unacceptable risks to quality and/or the health and safety of their operations.

Such systems (which include supplier vetting and supplier auditing) will also be capable of identifying cases in which a supplier's management of health and safety is deficient so that remedial action can be taken. Companies which exercise such a role in relation to their suppliers often support them through the provision of appropriate health and safety information and consultancy, through training and periodic reviews of performance.

Often the client's motivation to exert influence over health and safety standards further up the supply chain is not only to exercise corporate social responsibility but to avoid adverse impacts on their business continuity arising from accidents and enforcement action. A supplier who suffers from a major accident, or who experiences high levels of work-related injuries, will be less reliable.

### **Stakeholder Health and Safety Concerns and Possible Adverse Effects on the Business**

Stakeholder' refers to a range of individuals or groups who are affected by the results of the business. Often poor health and safety means poor business performance, together with the financial implications that might have for the stakeholders.

Stakeholders may be internal (such as Directors, Trustees, the Workforce, Trade unions, on site Contractors) or external (such as Regulators, Insurers, Neighbours, Shareholders, Investors, Governments). In addition, global bodies (such as the United Nations and the ILO) set standards. With globalisation, such standards assume higher profiles and responsible organisations must pay attention to ensure compliance. Indeed, compliance with relevant ILO, IMO

and WHO codes for workplace health and safety is often a requirement for operating in developing economies, in particular for projects funded by the World Bank or the International Monetary Fund.

When things go wrong with an organisation that can affect its reputation (such as a major accident) it is essential that the organisation manages the situation when it occurs. Major incidents can significantly affect a company's image and brand, which in turn can have a long-lasting detrimental effect on sales.

Global brands need coherent communications policies. A global brand, such as discussed below, cannot ignore the fact that problems that occur in one part of the world will be able to impact on sales elsewhere. Such a brand needs a common purpose throughout the organisation, so the response to a crisis can be coordinated.

### **Internal Stakeholders**

#### **Directors:**

- Directors can be held criminally responsible for major health and safety failings. For example, some countries may be able to prosecute them for personal manslaughter.
- Directors are often financially incentivised to hit sales and profit targets. These financial bonuses can be extremely large, often in millions of dollars for Chief Executives. A major disaster would jeopardise their bonuses.
- Directors often own shares as part of their remuneration package. Since major accidents can have a massive impact on the share price and affect the payment of share dividends, this is another way directors' personal financial situation can be damaged by poor health and safety management.
- Since directors are often the public face of the organisation, their own personal reputation can be damaged by a major accident. Especially if the organisation is seen to respond poorly in the aftermath. This might force one or some of the directors to resign. This often results in their finding it difficult to find a directorship elsewhere and they may have to retire.

#### **The Workforce:**

- The Workforce obviously have a personal interest in their own safety.
- The future employment of the workforce is dependent on the continued existence and success of the organisation. Any major event which threatens the survival of the organisation also threatens the livelihoods of the workers. If the organisation also provides a pension scheme and private health insurance scheme, closure of the organisation can result in future pensions being lost and current medical care being suspended.

#### **Trade Unions:**

- Unions represent the workers in the organisation. Their role is to defend the employment rights of their members, including their health, safety, and welfare. The unions have a moral responsibility to play their part in protecting their members from harm.
- There is a financial risk to unions from poor health and safety performance. If a union is seen to be ineffective at helping or protecting members' interests, then members may cancel their membership. Or new employees may be dissuaded from joining the union. This will reduce the Union's monetary income. And having fewer members means the union has less influence and power over management.

#### **Contractors:**

- Contractors obviously have a personal interest in their own health and safety.
- Similarly, to the workforce, they are also dependent financially on the client. If the client were to close then the contract would be lost, leading to unemployment of some of the contractors' workers.

## External Stakeholders

### Insurance Companies:

- Insurers are expected to carry the financial risk if the insured event occurs. This means that insurers may have to pay significant sums of money, often in the millions or billions, if a major disaster occurs. This will significantly reduce their profits for a period of time. In extreme cases, this can threaten the survival of the insurance company.

### Regulators:

- The national or industry regulators are expected to ensure that organisations operate within the boundaries of the relevant safety rules and laws. In the event of a major accident the reputation of the regulator can be damaged. They may be seen as ineffective or powerless. This can result in a loss of funding from government, in being closed, or restructured, or being merged with another regulator.

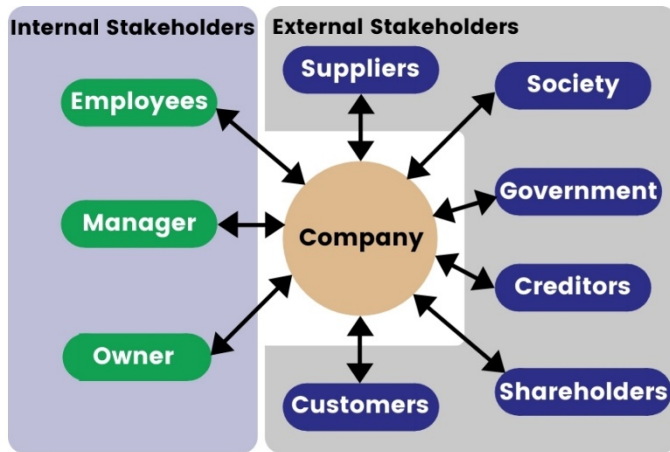
### Neighbours:

- Neighbours, especially those next to a large petro-chemical or nuclear facility, can be significantly affected if a major disaster occurs. Their properties can be damaged or destroyed, and even minor incidents can result in the release of hazardous substances leading to evacuation or having to stay indoors.
- Domestic neighbours living next to a high-risk facility can also suffer from increases in their insurance premiums and a decreasing value of their homes.
- Commercial neighbours can see their operations being disrupted. In some cases, a major disaster can lead to the destruction of surrounding businesses.

### Shareholders and Investors:

- Shareholders and investors own shares in the organisation. In the event of health and safety failings they may see the value of their shares decrease.
- They also receive the payment of a dividend for each share they own, and the size of this payment is dependent on the size of the organisation's profits. Since poor health and safety management can reduce the profits, this could reduce the return on investment for shareholders.
- If the business closes due to a major health and safety incident, then all the money invested is lost.





### Example: Toyota

Between 2009 and 2011 Toyota had to recall 9 million vehicles around the world because of concerns in the US over defective accelerators and out-of-position floor mats. It was thought the latter could potentially jam accelerators and had been linked to several fatal accidents. The recall severely damaged the brand's image and Toyota estimated that the scandal cost it \$2 billion in sales. Investigations since have struggled to conclusively determine the cause of the accidents, with driver error and electronics both being blamed by separate investigations.

### Example: BP Deepwater Horizon

On the evening of April 20th, 2010, a blowout at BP's Deepwater Horizon oil rig in the Gulf of Mexico caused an explosion which ripped through the rig, killing 11 workers, and causing an oil leak which continued for 87 days.

By the end of the disaster, 3.2 million barrels of oil had leaked into the Gulf. Although BP was not the sole owner of the rig, it took the greatest share of the blame. Its share price more than halved, from a high of £6.51 to £3.05, and the company suspended payment of share dividends to shareholders for some time. This severely impacted pension funds around the world, especially in the UK where it is estimated BP dividends made up between 14% to 16% of the average pension fund's income. Shares have not yet fully recovered.

In addition, BP paid \$18.7 billion in fines to the US government.

### Moral Obligation to Raise Health and Safety Standards within the Supply Chain

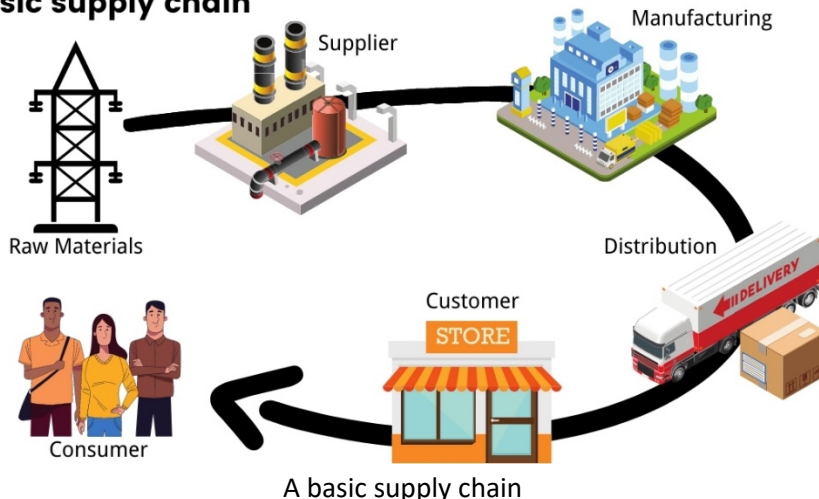
With the increase of 'globalisation', international trade between the 'wealthy' nations and the 'developing' economies has resulted in many examples of workers being paid very low wages and poor working conditions.

Many consumers no longer wish to play a part in what is perceived by some to be 'exploitation'. More and more people now want to be part of the 'solution' instead of part of the 'problem'. Consumers who buy goods that have been produced using 'exploited' workers have begun to put pressure on the supplier organisations. Consumers are demanding more and more that trade be 'fair'. Suppliers have responded by beginning to develop codes of conduct which ensure that exploitation is identified and eliminated where possible.

For example, in 2007 the UK Chartered Institute of Purchasing and Supply Management issued a Code of Conduct for its members entitled 'Ethical Business Practices in Purchasing and Supply Management'. The Code sets out in detail how its member should set up contracts with suppliers in developing economies to ensure that workers have fair pay and reasonable working conditions. The Code also specifies the necessary arrangements for members to audit their suppliers so that standards remain acceptable.



### A basic supply chain



## The Role and Function of Corporate Governance in a System of Self-Regulation

### Meaning of Self-Regulation

Self-regulation can be defined as "a regulatory process whereby an industry-level organisation (such as a trade association or a professional society), as opposed to a governmental organisation, sets and enforces rules and standards relating to the conduct of firms in the industry." In some cases, an association of businesses is not even required. Single organisations can also self-regulate their own activities and may create their own internal standards on health and safety performance.

Businesses use self-regulation to decrease risks to consumers, increase public trust, and combat negative public perceptions. It complements existing laws by imposing supplemental rules to govern the behaviour of firms. Industries have chosen self-regulation in response to both the absence of government regulation and the threat of excessive government regulation. For example, the US Forest Stewardship Council was established in response to industry concerns about the lack of government regulation to address the sustainability of natural resources. Alternatively, self-regulation may be implemented in response to catastrophic events, such as the formation in the US of the Institute of Nuclear Power Operations after the Three Mile Island accident to set power-plant safety guidelines. Self-regulation may even occur in a tightly regulated industry. Even under such conditions businesses may still come together to form cooperative agreements to establish industry standards or best practices.

International organisations that operate in multiple often use self-regulatory models because the legal requirements vary from country to country. If the organisation attempted to comply with each country's requirements, then there would be large variation in safety management practices and levels of risk across the business. Instead, many organisations prefer to adopt a high standard of safety that is compliant in all relevant countries and adopt this consistently in all operations. Even for organisations that operate in one country only, there may be concerns that self-regulation of their health and risks is essential if their host country has less well-developed legislation.

The benefits of self-regulation are:

- Resources are not wasted on irrelevant health and safety issues. Safety management procedures are tailored to the risk profile and requirements of the business.
- Health and safety standards are applied consistently across different countries.
- Standards are not linked to the legal requirements. Government enforcement agencies cannot act across borders, so international self-regulation provides rules to govern behaviour where there are no government rules.
- Since the standards are usually at a higher standard, often best practice, than basic legal compliance, compliance with the law is usually achieved quite easily.

- The standards are developed by those who are directly involved in managing the risks and understand the issues better. This means the standards are highly relevant to the industry.
- Since self-regulation is developed by those directly involved, this generates a sense of ownership of the standards.
- Industry standards are easier and quicker to update than legislation.
- Compliance with industry standards usually offers a quicker and cheaper means of solving problems and addressing health and safety issues, since commercial organisations will also seek to achieve efficiency and maximum performance with minimum resources. It is also cheaper for the taxpayers since enforcement of government regulations costs money.
- An industry will often harmonise its standards across businesses. This means that workers will be familiar with safety practices even if they change organisations.

The limitations of self-regulation are:

- There is not always an industry or 'umbrella' standard to strive for.
- Without the threat of legal enforcement, not everyone in the organisation may follow the internal standard. Internal rules may be viewed as 'optional'.
- Without external government regulation on specific risks, some health and safety issues may be missed if there is no organisational awareness of these problems, or if they are not seen as a risk.
- Self-regulation has an inherent conflict of interest. The organisation may put its own interests ahead of worker or public safety. However, this can be avoided by including stakeholders in its decision-making processes or structuring the decision-making body so that it is not dominated by commercial profit-driven interests.
- If the organisation sets and monitors its own standards, then the standards may be too low, or compliance against these may not be taken seriously.
- It can create difficulties when working with other organisations if they use different safety standards.
- Internal standards are more difficult to audit. It is not always possible to obtain 3rd party accreditation unless it is an industry wide standard.
- Stakeholders do not always value a self-regulatory model, due to the potential for non-compliance, conflict of interest, and the lack of impartiality in reporting results.
- The public is particularly sceptical of self-regulation, especially in industries where the interests of the industry and society do not align.

## Corporate Governance

Corporate governance broadly refers to the mechanisms, processes, and relations by which organisations are controlled and directed. Corporate governance is the way a corporation polices itself. It is a method of internal control, governing the company like a sovereign state, instating its own customs, policies, and laws from the highest to the lowest levels of the organisation.

Corporate governance is intended to increase the accountability of the organisation and to avoid massive disasters before they occur. The purpose of corporate governance is to ensure effective, entrepreneurial, and prudent management that can deliver the long-term success of the company. Because corporate governance is all about the organisation's system of internal control, it is strongly linked to self-regulation.

For many organisations, health and safety management is a corporate governance issue.

The board of directors is responsible for the company's system of internal control. It should set appropriate policies on internal control and seek regular assurance that will enable it to check that the system is functioning effectively.

They have the power to ensure adequate resources in terms of time, money, and effort are applied to health and safety, and that it is given equal importance to quality and profit.

It is the responsibility of management to implement board policies on risk and control. In fulfilling its responsibilities, management should identify and evaluate the risks faced by the company, for consideration by the board, and design, operate and monitor a suitable system of internal control which implements the policies adopted by the board.

All employees have some responsibility for internal control as part of their accountability for achieving objectives. They, collectively, should have the necessary knowledge, skills, information, and authority to establish, operate and monitor the system of internal control. This will need an understanding of the company, its objectives, the industries, and markets in which it operates, and the risks it faces.

### **How Internal Rules and Procedures Regulate Health and Safety Performance**

A report from the European Agency for Safety and Health at Work entitled "*Leadership and Occupational Safety and Health - an Expert Analysis*" concluded that merely imposing new health and safety rules on workers was of limited value on its own. Rather, research suggests that lasting and continuing improvements in health and safety could only be brought about by fundamental organisation change i.e., the creation of a prevention culture which shows that the organisation places the highest values on health and safety in the workplace. This means:

- Leaders must take seriously their responsibility for the establishment of a positive prevention culture. This will require them to employ a variety of leadership styles which can take account of the cultural context (different groups or nations).
- Leaders should be seen to prioritise health and safety policies above other corporate objectives and apply them consistently across the organisation and over time.
- Health and safety measures can only deliver to their full potential if they have the undisputed commitment of an organisation's board and senior management. High-level management, not just line management or specialists, must be directly involved in implementing OSH policies.
- Good, regular, multi-level communication is essential to the delivery of improvements in health and safety. Leaders should set out to cultivate an open atmosphere in which all can express their experience, views and ideas on health and safety, and which encourages collaboration between stakeholders, both internal and external, around delivery of a shared health and safety vision.
- Leaders should show they value their employees and promote active worker participation in the development and implementation of health and safety measures.
- Reward of safe and healthy behaviours, and consistent decision making and actions.

A key element of managing health and safety involves the development and implementation of rules and procedures to control risk. For the rules and procedures to be effective they should be:

- Developed in consultation with workers
- Communicated to workers
- Enforced

### **Development**

Involving workers in health and safety issues is critical to improving the culture and performance. This is especially achieved when involving workers in the risk assessment process, and in the development of the resultant control

measures (the rules and procedures.). In this way, the reasons for the rules will be understood, and are more likely to be complied with and self-enforced.

### **Communication**

Organisations should have processes in place to ensure that health and safety rules and procedures are effectively communicated to all workers (including supervisors and managers) who may be affected by them. This includes any revisions. Team briefings, toolbox talks, and health and safety committee meetings are typical means of communication.

Health and safety measures are more likely to succeed when leaders communicate their vision for health and safety across the organisation, involve others in developing appropriate measures, encourage a health and safety culture, ensure policies are applied fully and consistently, and actively demonstrate the required behaviours and act as role models for the workers.

### **Enforcement**

It is pointless having rules and procedures if they are not followed. The implications of not following them should be clearly communicated to all workers (i.e., retraining at least, or disciplinary action and dismissal at most). Whilst supervisors and managers are key to enforcing health and safety rules and procedures, in organisations with strong safety cultures it is often a co-worker who will intervene if a colleague is seen to be breaching a rule or procedure.

### **Health and Safety Self-Regulatory System**

Health and safety management systems seek to manage risk to the lowest level reasonably practicable, in accordance with the laws in the country of operation. This includes a clear policy on health and safety, accompanied by objectives and targets. This enables the process of self-regulation to begin.

Part of the self-regulatory risk management process is the establishment of effective health and safety rules and procedures. The rules and procedures set the standard of health and safety that the organisation expects and may be higher than the minimum legal requirements.

Senior managers need to ensure that management of compliance with rules and procedures is done in a manner that emphasises health and safety results rather than just compliance with the rules and procedures. For the rules and procedures to be effective they must be enforced by the organisation and reviewed to ensure they are delivering the desired results. This requires the full support of, and monitoring by, the organisation's management team.

The health and safety management system should seek to identify non-compliance with its process. This will enable these to be correct on a timely basis and prevent future non-compliances of the same type.

Failure to meet the requirements of the management system should be identified through active monitoring and auditing. Internal enforcement mechanisms are then used to bring the management system or conformity with it back into control. In this way the health and safety risks and performance of individuals are actively managed by an internal self-regulatory process.

## 1.5: Third Parties

The term "Third party" refers to those who do not work directly for an organisation, and includes contractors, agency workers, visitors, trespassers, other employers who share premises (such as on business parks, in shopping centres, and large office buildings) and members of the public.

### Contractors

A contractor is anyone who carries out work for an organisation (set out in a contract) who is not an employee. Contractors may be engaged in long-term work (such as a catering provider on an offshore platform) or short-term services (such as bringing a specialist contractor in to clean out a tank).

### Agency Workers

An agency worker is an individual supplied to an organisation by a recruitment agency. This person will work under the client's direction and supervision, on either a short-term or long-term basis.

### Visitors

Visitors are third parties who have entered an organisation's premises either because they have the authority to do so (such as enforcement agency inspectors) or have been invited by the organisation (for example, suppliers or clients).

### Trespassers

A trespasser is someone who enters an organisation's premises without permission.

### Members of the Public

This includes neighbours in the surrounding premises of the organisation, who may be affected by the organisation's activities, and people who enter an organisation's premises to purchase goods (such as shoppers). Members of the public who are not employees may become visitors or trespassers, depending on whether they have permission to enter.

## Reasons for Ensuring Third Parties are Covered by Safety Management Systems

There are three reasons why organisations need to consider the health and safety of third parties: legal, economic, and moral. Organisations who fail to recognise this when developing their management system can suffer financially by having to pay compensation to injured persons and fines for any legal breaches.

### Legal Reasons

Legislation often lays down requirements for organisations, not only to protect employees, but also non-employees such as contractors, visitors, and members of the public.

In Europe for example, the Seveso directive was introduced in 1982, requiring all members of the European Union to introduce legislation to protect people (in particular the public) and the environment from major accident hazards.

The UK Health and Safety at Work, etc. Act 1974, in particular Sections 2 and 3 place requirements on employers to *"ensure, so far as is reasonably practicable, the health, safety and welfare of all his employees"*. And to *"conduct his undertaking in such a way to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected, are not exposed to risks to their health and safety"*.

This means that organisations, when developing their management systems, must consider health and safety risks to third parties such as contractors working on their premises, visitors, members of the public, and even, in the UK, trespassers.

ILO - OSH 2001 (Guidelines on OSH management systems) specifies:

*"Arrangements should be established and maintained for ensuring that the organisation's safety and health requirements, or at least the equivalent, are applied to contractors and their workers." (3.10.5)*

### **Economic Reasons**

Organisations would be foolish not to consider the financial implications of accidents involving third parties, either because of poor management of third parties (such as contractors) or accidents affecting third parties (such as the public).

The Deepwater Horizon disaster in 2010 (in the BP operated Macondo prospect in the Gulf of Mexico) claimed the lives of 11 contractors and caused a massive oil spill and environmental catastrophe. The cost of the disaster to BP was estimated to be more than \$60 million.

A gas explosion in Scotland, UK, in 1999, claimed the lives of 4 members of the public. Gas distribution company Transco was fined £15 million.

The costs of harming third parties are often covered by Public Liability Insurance. But insurance premiums can be increased. Many costs will not be covered, such as the damage to the organisation's reputation.

### **Moral Reasons**

*"All too often lives are shattered unnecessarily because of poor working conditions and inadequate safety systems. Let me encourage everyone to join in promoting safety and health at work. It is not only sound economic policy, it is a basic human right."*

(Kofi Annan, Former Secretary-General of the United Nations).

Moral responsibilities may be individual, meaning each person in the organisation is accountable for doing what is right, or communal responsibilities, which involve all personnel. Organisational culture can demonstrate the importance of moral responsibilities in the organisation. Organisations where the safety culture is strong are often driven by an "it's the right thing to do" attitude, rather than the law. It is those organisations that generally demonstrate the best health and safety standards.

### **Duties Owed to and by Third Parties**

When more than one party is involved in an organisation, such as the employing organisation (client) and contractors working for them, there are shared duties with respect to health and safety. In simple terms, the client is responsible for things under his control that can affect the health and safety of his own workers and those of a contractor. A contractor is responsible for things under his control that may affect his workers and those of the client. As an example, a client operating a chemical plant is responsible for ensuring that contractor workers working on a piece of client's equipment are not affected by chemicals in the equipment. A contractor who is removing asbestos on a client's premises must ensure that both his workers, and the clients, are not affected by the asbestos.

Clients and contractors must provide each other with information on the hazards and risks to each other's workers.

Visitors to a client's premises will probably be accompanied by a client's representative and will be bound by any client safety rules (such as emergency procedures) that might affect them whilst on the premises. Visitors must only keep to designated areas. A client is responsible for the health and safety of everyone who might be affected by their activities. This includes visitors.

Organisations who share premises (such as a business park), particularly when there are higher risk activities involved, may need to communicate to each other with respect to the hazards in each other's business and the emergency actions that may need to be taken in the event of an incident on one of the premises.

### **Reasons for Providing Hazard and Risk Information to Third Parties**

Without adequate information on the hazards and risks they face, third parties (including contractors and members of the public) cannot take any precautionary measures.

In many countries, there are legal requirements for organisations to provide third parties with information. For example, under the OSHA Process Safety Management standard in the USA, there is a requirement for employers to give process hazard information to contractor workers. In addition, employers must ensure that contractors are properly selected. Clearly, if workers are aware of hazards and risks and their impact, they are much more likely to implement the required safety control measures.

In the UK, under the Control of Major Accident Hazards (COMAH) Regulations, employers are required to supply information to the surrounding public who may be affected by a major accident, which will include information on the activities of the organisation, the types of substances or hazards involved and details of the controls that have been put in place to prevent a major accident. In addition, they will be provided with actions that they should take to protect themselves in the event of an emergency (for example, stay indoors and tune in to a local radio or television station).

In addition, article 17 of ILO convention C155 requires:

*"Whenever two or more undertakings engage in activities simultaneously at one workplace, they shall collaborate in applying the requirements of this Convention."*

To do this there must be a sharing of health and safety information between client and third party.



## 1.6: Insurers

### How insurers can influence organisational health and safety

Insurers play a major role in helping organisations to protect against and manage health and safety risks. They do so by offering advice and guidance on assessing and managing risk. Failure to effectively manage risk can result in insurers increasing premiums – or even refusing to offer insurance cover at all.

Insurers are not enforcement regulators – they deal with civil, not criminal, liability.

Insurers have identified a number of key actions organisations can take to effectively manage health and safety risks. They include:

- Ensuring senior managements' commitment to and leadership on matters of health and safety
- Ensuring that organisations have “competent persons” to assist them in complying with health and safety legislation and requirements
- Ensuring that organisations have a structured approach to the management of health and safety. This means carrying out a risk profile and assessing organisational risk. This should confirm that risk is being well managed, or whether more needs to be done. In addition, arrangements need to be in place to ensure the effective planning, controlling and review of the risk control measures
- Having undertaken risk assessment and established a set of performance standards, organisations need to ensure that these are implemented and followed. The process should involve workers or worker representatives. Competing demands between production targets and health and safety, together with employee perceptions of bureaucracy and ineffective health and safety leadership all have a negative impact on the safety culture within an organisation.

### The role of loss adjusters and claims handlers

An insurance claims handler is involved in managing a claim from the start through to settlement, making decisions on the extent and validity of a claim, and checking that the claim is genuine and not fraudulent. In addition to communicating with policyholders, or their representatives, the claims handler will also liaise with external experts such as loss adjusters and lawyers.

Insurance companies are generally reluctant to pay out large settlements to policyholders. They might therefore call upon a loss adjuster to investigate a claimant's case.

A loss adjuster is a claims specialist appointed and paid by an insurance company, usually to investigate a complex or contentious claim on their behalf. The loss adjuster is responsible for establishing the cause of a loss and to determine whether it is covered by the insurance policy. They will therefore visit the site of the loss in order to gather evidence and assess damage.

The loss adjuster will then present the insurance company with a report, recommending appropriate payment based on their perceived validity of the claim. Essentially, they review a claimant's claim from the insurance company's perspective.

## Learning outcome 2

You will be able to promote a positive health and safety culture by:

- gaining commitment and participation.
- engaging, supporting, and influencing leaders (and others) to change attitudes and behaviour and make health and safety a priority.

### 2.1: Organisational structures

#### Concept of the Organisation as a System

A system may be defined as: "a set of interacting or interdependent system components forming an integrated whole".

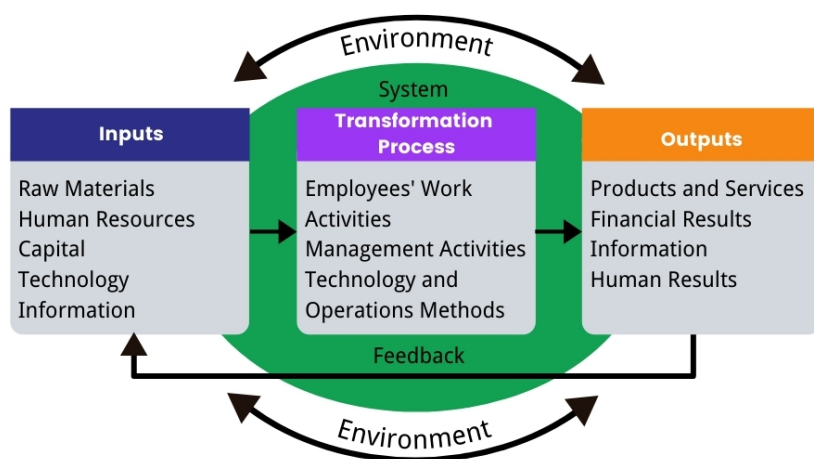
Many parts of organisations are often described as systems (e.g. the financial accounting system, the internal post system, the email system, the I.T. system, etc.). It is not such a significant leap to see the whole organisation as a system itself.

When we use the term "system", we mean the whole entity made up of interrelated, functioning parts. The effective functioning of the whole depends, to a greater or lesser extent, on the performance of the parts. If we look at the human body, certain parts, such as the heart, lungs, and liver, are crucial to the survival of the body. Others, such as hands, feet and gall bladder, function to assist survival, but the body could live without them. All the parts of the human body are linked through the nervous system so that change or malfunction in one part affects the other parts.

Likewise, the engine and its related parts are vital to the running of a car, whereas parts such as the windscreen wipers merely help it to be effective and safe in wet conditions.

We can parallel this approach in looking at organisations. They, too, have certain vital parts and, if these fail, the whole organisation ceases to function. For instance, if finance elements fail, the organisation will have no funds and will cease to exist. Just as with the body or the car, change or malfunction in one part of an organisation affects other parts. This is what we mean by saying that the parts of an organisational system are "functionally interrelated".

#### The Organisation as an Open System



The above figure shows an organisation represented by a system comprising "inputs" (such as raw materials, resources, and technology), that are "processed". The result of this "process" is the production of several "outputs" (such as products or services, financial results, human results, waste). The feedback loop ensures that the correct output is consistently produced.

From a health and safety perspective, the organisation is also a system. There are inputs, a process, and outputs, and all of these interact with the external environment. There are risks in all three areas, and the organisation can introduce various controls to reduce these.

#### **Inputs:**

- Design of products
- Procurement of tools and equipment
- Recruitment of personnel
- Information, both internal and external

Controls on inputs can include:

- Procurement standards to ensure only safe equipment is purchased
- Selection of competent workers at the recruitment stage
- Collection of safety information related to equipment and substances
- Quality checks on incoming goods. Managing the supply chain to ensure good standards
- Keeping information up to date. For example, requiring updated copies of Material Safety Data Sheets on an annual basis

#### **Process:**

- Operations, both routine and non-routine
- Maintenance

Controls can include:

- Risk assessments
- Use of the hierarchy of controls
- Safe systems of work
- Training in the tasks
- Supervision
- Behavioural safety initiatives

#### **Outputs:**

- Products and services
- Waste
- Incidents
- Civil claims
- Prosecutions

Controls can include:

- Waste management procedures
- Insurances, such as Product Liability, Employers' Liability, etc.
- Customer aftercare
- Incident investigation procedures
- Claims handling procedures

## Organisational Structures and Functions

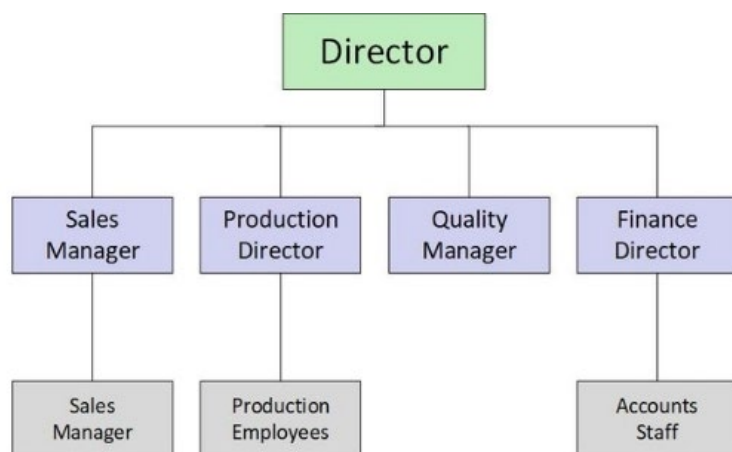
Organisations involve a group of people who interact with each other to achieve the stated goals or objectives. In terms of individuals the goal is to earn money. In terms of the organisation the objective is usually to make profit.

### Formal and Informal Structures

In most organisations, there is a formal allocation of work roles in line with job titles and job descriptions which contain the procedures necessary to control and integrate work processes. However, there are always informal relationships between individuals, and the interactions between workers and managers may not always comply with the formal communications route.

Most organisations describe their structure in the form of an organisation chart. This shows the reporting relationships from the chief executive of the organisation down to the staff carrying out the most basic tasks.

The diagram below illustrates a typical formal organisational structure.



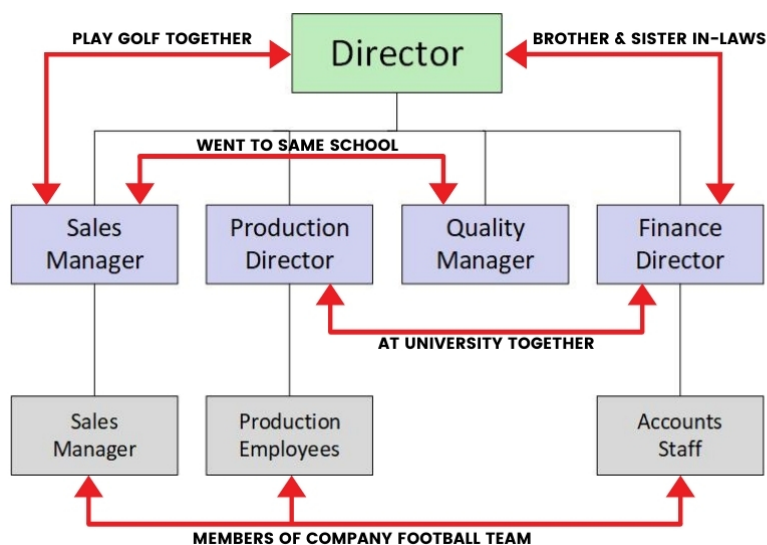
Ideally, every person within the structure should have a defined role with clear lines of reporting, communication. Workers need clear instructions regarding their expected work performance. These roles need to be understood by other workers in the organisation so that everybody works together to achieve the organisational aims and objectives.

But an organogram (organisational chart) cannot identify all the different ways in which staff interact with each other. Usually, it will be the personal relationships and not the hierarchy that determines how communications flow within an organisation, and how the aims and objectives are achieved.

Informal organisations are primarily social creatures, made up of the sum total of social normality, relationships, and interactions that affect how an organisation works. Whilst a formal organisation is cold and impersonal, an informal organisation is intensely personal. It's all about social interactions and relationships between the members. Members of an informal organisation can certainly hold official offices and have formal duties, but they also bring their own values, personal interests, and assumptions into the equation of how they act. Members develop friendships, alliances, enemies, trusted sources of information, and preferences on how tasks should be performed.

These social influences may cause a member of the informal organisation to work in conjunction with the organisation, in parallel with it, or even against it.

The diagram below shows the formal structure together with, shown by blue lines, the informal structure.

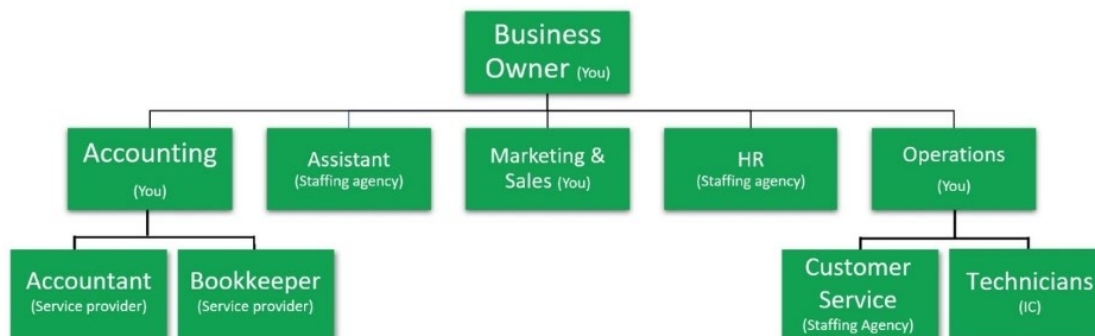


### Large or Small Organisations, and Hierarchical versus Flat Management Structures

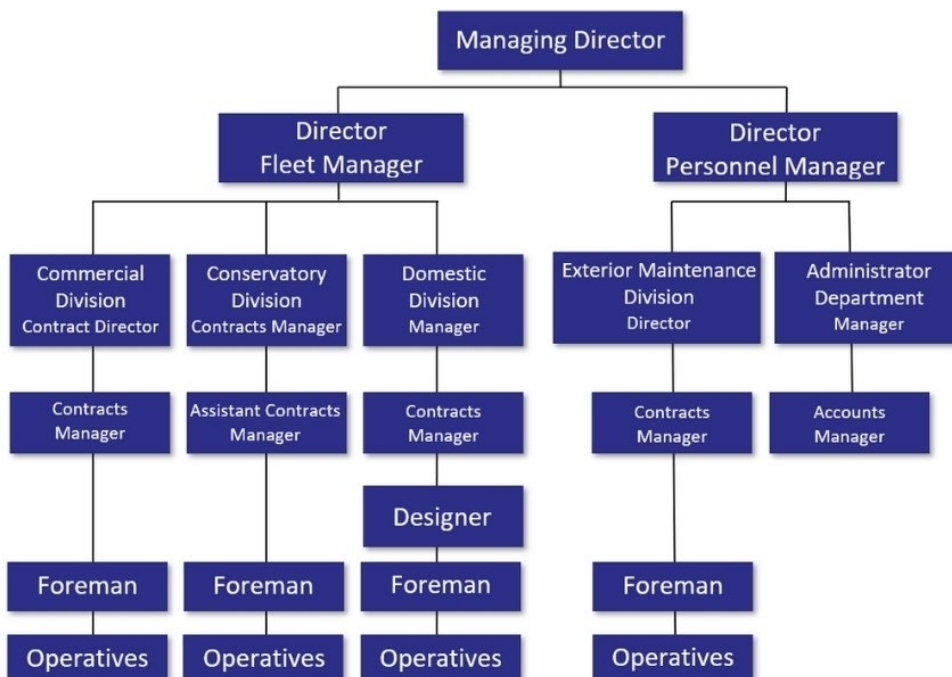
Smaller organisations generally have fewer layers of management, and less staff than larger organisations and therefore, their organisational charts often appear to be flat. They look similar to a single or double stack of bricks with one or two bricks on top. As a result, workers on the front line have a wider range of work tasks and more responsibility than workers with similar job titles in larger businesses.

Larger organisational structures represent a more pyramid appearance. They often have several management layers which creates a more complex reporting/communication structure. In these larger organisations, responsibility can be more defined as more staff are available for specific roles.

### Small (Flat) Organisation chart



### Large (complex) Organisation chart



Strategic decision-making is generally more centralised in smaller organisations than in larger organisations, due to the fewer number of managers. It is common for company owners to make virtually all the business decisions, especially in the first five years of a business. When an organisation begins to expand, however, it becomes impossible for a single person or small team of owners, to make every decision and so decision-making authority begins to spread out among the various layers of management.

Formal lines of communication, or flows of operational information, are a part of an organisation's structure. In small organisations, communication between workers is handled in-person much of the time, especially when the organisations only operate in a single location. There is more opportunity for front-line workers to interact directly with executives, especially where there are shared offices or separate offices in close proximity. As organisations grow, this level of communication becomes less.

In larger organisations, most of the communication takes place over large distances via phone, skype or email. In some cases, workers who work in isolated locations rarely meet each other in person.

### **Role of Management**

Essentially, the role of managers is to guide the organisation towards goal accomplishment. All organisations exist for certain purposes or goals, and managers are responsible for combining and using organisational resources to ensure that their organisations achieve their purposes.

One Management role is to enable the organisation to work towards its purposes or aims by assigning duties and tasks that organisational workers undertake.

If all the activities are designed well by managers, each individual worker will contribute productively to achieving the organisational goals.

Management strives to encourage individual activity that will lead to reaching organisational goals and to discourage individual activity that will hinder the accomplishment of the organisation objectives.

### **Conflict between Organisational and Individual Goals**

Understanding how personal interests and goals fit within the structure of the organisation will alleviate conflict of interest problems.

An individual may be tempted to pursue their own personal goals when they do not correspond with the organisational direction, creating a conflict that could hamper organisational success.

Individuals within organisations are usually motivated to work toward goals that result in increased financial compensation, promotion, and peer recognition. Most often, however, these individual motivations are not directly aligned with the organisation's broader goals. The negative consequence is that while individuals in the organisation strive toward personal motivations, very few people, if any, are directly concerned with the organisation's aim: delivering products and/or services to market, that meet the needs of customers.

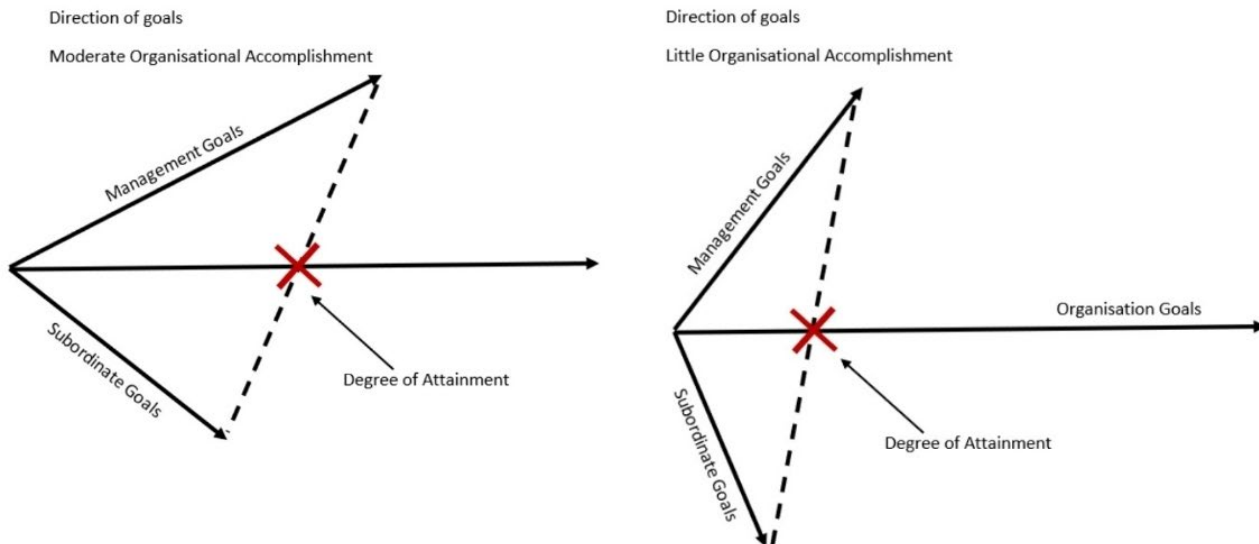
For businesses to be successful the goals of the individual and the organisation need to be "aligned". If an organisation wants to be "best in class" then individuals need to have goals that work towards the organisation's goals.

For example, if a bank gives its salespeople the goal of "Sell more loans", the salespeople will sell more loans. But they won't check that the people are capable of repaying the loans. The bank will be saddled with bad debt. The goal is the bank is to sell good quality loans, that will be repaid. So, they must adjust the goal they give their salespeople, to include the consideration of repayment.

When organisational goals are shared by all, the term goal "congruence" can be used. This means "*the state of coming together, the state of agreement*". If two goals are "incongruent", they are motivating people to act in different directions.



To illustrate this concept, we can divide an organisation into two groups, management, and subordinates. The respective goals of these two groups, and the resultant attainment of the goals of the organisation to which they belong, are illustrated in Figure 1 below.



In this instance, the goals of management are aligned with the goals of the organisation but are not the same. On the other hand, the goals of the workers directly conflict with those of the organisation.

The organisational management goals and the goals of workers requires compromise. Successful performance is a combination of both.

This situation can be much worse when there is little accomplishment of organisational goals, as illustrated in Figure 2. In this situation, there seems to be a general disregard for the welfare of the organisation. Both managers and workers see their own goals conflicting with those of the organisation.

Consequently, both morale and performance will tend to be low and organisational accomplishment will be negligible. In some cases, the organisational goals can be so opposed that no positive progress is obtained.

The result often is substantial losses or draining off assets (see Figure 3). In fact, organisations are going out of business every day for these very reasons.



The hope in an organisation is to create a climate in which one of two things occurs:

1. The individuals in the organisation (both managers and subordinates) either see their goals as the same as organisational.
2. Individuals can visualise their own goals being satisfied when working towards organisational goals.

Consequently, the closer we can get the individual's goals and objectives to the organisation's goals, the greater will be the organisational performance.

One way that effective leaders can bridge the gap between the individual and organisational goals is by creating a loyalty among their followers. This can be achieved through becoming an influential spokesperson for workers and higher management. This type of leader is at ease when communicating organisational goals in return, workers find it easy to associate personal satisfaction when working towards them.

### **Integrating Organisational Goals with the Needs of the Individual**

For the organisation to achieve its goals, workers need to feel a sense of involvement and ownership. This ownership is an important factor in getting workers to "buy in" to the goals of the organisation.

Giving workers *authority* when they carry out tasks (for example purchasing materials, planning, and carrying out the task in accordance with a procedure). Authority also carries *responsibility*. For example, whilst given the authority for an employee to carry out all aspects of a task, he/she will have the responsibility for completing the task safely, and in an agreed time frame.

With responsibility comes *accountability*. In other words, if a worker is given the authority and responsibility for undertaking a task and fails to carry out that task properly then he/she must be held accountable for their actions.

Limits of authority and responsibility should be clearly defined so that workers are aware of the extent, and limitations, of what they can and cannot do.

### **Internal Influences on health and safety within an organisation**

#### **Finance**

Setting up and running a company requires considerable financial investment. Once established, the company needs to generate more income than it expends on running costs i.e. cost of premises, plant, wages, insurance, etc. To do this, the company will set annual budgets specifying the amount of money available to each department to support its running costs and setting production targets to be attained. When budgets are being pared down to make savings, very often some health and safety requirements will be at the bottom of the list or even omitted altogether.

Lack of sufficient funding will inevitably lead to a lessening of the resources required to manage health and safety effectively. To the uninitiated, health and safety costs might appear minimal and could be easily absorbed in departmental administration costs. To operate on this basis would be a recipe for financial disaster and could lead to costly prosecutions for non-compliance.

Also, organisations with limited financial resources may be tempted to go for short term safety solutions (such as giving workers suitable PPE) rather than investing in the better, but more expensive, long term solutions, which, in time, may prove to be more cost effective.

Health and safety costs are no different from other organisational costs. However, since health and safety are both a legal, moral, and social requirement, with significant financial cost benefits, it makes sense to exclude it from the usual budgeting procedures. Whilst a day-to-day budget for basic safety expenditures (e.g. PPE and consumables) is useful, there should be no budgetary "limit" on what the company is prepared to spend. The company should spend whatever is necessary to spend to comply with its legal and moral requirements.

### **Production Targets**

Production or service targets are a necessary part of the running of an organisation. If the targets are seen to be realistic and achievable, and can be met without compromising safety, they are beneficial to an organisation. Setting targets that are clearly unattainable (such as asking contractors to complete a process turnaround in three weeks, when previous turnarounds have taken eight weeks) sends the wrong message about safety. It encourages shortcuts to be taken, which often increases the safety risk.

Research has suggested that where workers trust their leaders (managers/supervisors) they are more likely to believe that safety and production targets are compatible. It has also been found that trust between leaders and subordinates was directly linked to reduced injury rates within groups.

Managers who demonstrate positive action when safety is compromised (such as shutting down a critical piece of process machinery when the guarding has failed) send out a resounding message to workers.

Whilst many organisations claim to put "safety first", this is perhaps disingenuous. Commercial organisations exist to provide goods and services, and to make a profit. Therefore, production comes first, and this is entirely proper. Without production, there would be no profit and no jobs. However, production must not come at a sacrifice to safety. A job should only be completed if it can be done safely. Production and safety are equal.

### **Trade or Labour Unions**

Since their very inception, trade unions have seen the improvement of working conditions as one of their top priorities. Clear decrease in work-related accidents in the industrialised world, the improvement of work methods, and recognition of the effects of human behaviour in industries over the last century, is partly due to the efforts of organised labour unions.

Studies in Sweden have shown that one of the main reasons for the country's good health and safety record is the tradition of cooperation between workers and employers and the involvement of workers in decision-making since the early 1920s. Decisions based on two-way communication and agreement is a process which has continued to modern day. The involvement of workers is a major factor in improvements has been proven to deliver positive results.

When worker representatives conclude that working conditions are unacceptable, they can represent the workers in discussions with the employing organisation, with a view to making improvements.

If the Union and the organisation cannot reach an agreement on the necessary arrangements to keep workers safe, healthy, and comfortable, then there is the potential for an industrial dispute. This could lead to a strike, or other

refusal to work. However, some would argue that Unions often use health and safety as an excuse, when there are other reasons for the dispute, such as potential job losses, or simply attempting to maintain their political influence.

## Organisational Goals

The setting of goals and objectives for safety is just as important as setting wider business goals. Safety goals and objectives should be clearly specified in the organisation's policy and plan and communicated to workers. These goals and objectives send out a message to workers that safety is as important to the organisation's management as wider business goals.

As a minimum, goals and objectives should aim to ensure legal compliance. Better organisations go beyond that and aim for "best practice" or "best in class". Once developed, goals and objectives must form part of any OHS review process, with changes being made in the light of problems that the review process highlights.

An aim is the generalised goal of the organisation and the overall intention. An aim is therefore generally broad. It is ambitious, but not beyond possibility.

The objectives would be the specific steps required to achieve the aims. The objectives should be S.M.A.R.T.:

- **Specific** - Be precise about what needs to be done.
- **Measurable** - Monitored and measured against expected results.
- **Achievable** - Suitable for the competence level of those involved.
- **Realistic** - Appropriate for the resources (time, finance, staff, equipment, etc.) available to achieve them.
- **Time constrained** - Specific dates for completion ensuring there is time scheduled to allow for unexpected delays.

## Culture

The culture of an organisation is as influential on health and safety as the management system itself. The attitude of workers, managers and leaders affects peoples' perception of health and safety as well as the actions and compliance with any rules and procedures.

A negative culture can lead to apathy, people taking shortcuts and a general low morale within the organisation. It is often characterised by a rise in absenteeism, as workers do not like being at work. Reports of essential information may become inaccurate due to staff being disinterested or not understanding the significance of what they are reporting such as what it is used for and who reads it.

To combat this, there are some key areas to tackle:


- Communication - this needs to be two-way and effective and give all involved information on health and safety roles, how they contribute and why it is important. Clear lines of communication need to be established.
- Involvement of workers in new procedures and ideas to give a sense of ownership.
- Leaders and managers leading by example.
- Commitment being demonstrated from the top by ensuring suitable resources available and regular involvement and discussion of health and safety issues.

A positive culture will provide support and accurate information for managers and leaders to execute decisions regarding health and safety both in the long and short term.

## External Influences on health and safety within an organisation



### Legislation

Most developed countries have health and safety legislation. Organisations who choose to ignore it do so at their own risk.  For example, a large company in the UK was fined £15 million, after a gas explosion in 1999 killed four people. Also, a highly publicised rollercoaster crash in the UK in 2015, led to the operator, Merlin, being fined £5 million. Visitor numbers to Merlin's attractions across the UK decreased by up to 25% and remained low two years after the accident.

Changes in health and safety law are well publicised, and one of the tasks of a Health and Safety Professional is to keep up to date with impending changes, and the possible effects on the organisation.

In most cases, the law imposes more demands over time. Only rarely is legislation relaxed. Therefore, organisations can expect to be subject to ever greater safety regulation.

### Enforcement Agencies

Enforcement agencies influence organisations in several ways. Firstly, they have the authority to start proceedings (prosecute) organisations who have broken safety laws. This might be preceded with informal enforcement action, such as verbal or written advice or a warning. If an organisation is faced with enforcement action, in most cases it will be forced to comply.

Secondly, enforcement agencies provide advice, including "face to face" verbal advice and in the form of health and safety publications and guidance, which are usually offered free of charge. Most organisations will wish to comply with the guidance, since this is usually considered the best way of demonstrating compliance with the law. Guidance

changes over time, and this may lead to the organisation making improvements to its arrangements, to comply with the revised guidance.

### **Courts and Tribunals**

In criminal prosecutions (started by an enforcement agency) the court establishes whether or not the defendant (such as an organisation or an individual) is guilty or innocent of an offence. If guilty, fines or custodial sentences may be imposed. The consequences include bad publicity, loss of reputation, and potentially a decrease in sales or contracts years after the accident.

A criminal court also has the power to impose an "order" on an organisation. This forces them to take some action, such as corrective action, or publicise their failings.

Civil courts listen to claims for compensation for personal injury or ill-health, and have the ability to award financial compensation, thus affecting an organisation's profit.

Tribunals, amongst other things, can dismiss notices issued to companies by enforcement agencies. They can also mediate or hear grievances between workers or their representatives, and the organisation.

### **Clients and Contractors**

The nature and relationship between clients and contractors may have profound effects on the health and safety of a particular contract.

Both clients and contractors need to be aware of their duties and responsibilities when it comes to health and safety as lack of knowledge would not be a suitable defence in the case of an accident or fatality due to lack of workplace safeguards or risk control.

Contractors should be selected carefully ensuring that sufficient time and resources are allocated in ensuring that contractors have the suitable skills, experience, and competence to undertake the required work. This will involve looking at past records of health and safety, taking up references, checking competencies of staff employed by the contractor and ensuring that contractors employ the same level of assessment for any sub-contractors they use. Without these checks, clients can be found to be at fault if there are any accidents or incidents relating to health and safety during the contract works.

Responsibilities and expectations need to be clearly defined between both clients and contractors before work commences. This should include clear communication channels. Where amendments are made, either before or during the works, these responsibilities and expectations need to be amended and agreed before changes are made.

This should ensure that contractors are less tempted to cut corners when faced with impractical timescales and that the client can state the level of quality they expect to receive.

This clarity will be beneficial for the reputation of both parties when it comes to negotiating future works with other organisations.

### **Insurance Companies**

Insurance companies directly influence an organisation where there is a national requirement for arranging liability insurance for workers (such as Employer's Liability Insurance in the UK). Should a company suffer an unusually high accident rate, then the insurance company can either increase their insurance premiums or insist that the company adopt risk reduction measures. It is now more common for insurance companies to carry out their own inspections

of workplace risks and thus set certain minimum standards. Insurance companies can impose certain conditions on the organisation, such as specification and type of automatic firefighting equipment that is installed, and what training should or should not be provided.

Insurance companies have become increasingly aware that they may have underestimated the risks relating to some organisations they are insuring. This can cause them to revisit the risks and factors that may have led to insurance claims from workers in the organisation. It is not unusual for insurance premiums to significantly increase. In some cases, insurance may be revoked altogether, if an organisation refuses to comply with their demand. If an organisation is refused insurance, it may be difficult to obtain insurance from elsewhere.

### Public Opinion

Public opinion can have a powerful effect on legislators, which could result in legislation being passed or prosecution being instigated. *The enforcement agency will only prosecute if it is "in the public interest"*. Other actions may involve a particular company's products being deliberately boycotted by consumers because of the company's behaviour, or by other more direct forms of action by protesting consumer groups.

Public opinion is often formed by the press and other media, such as television, magazines, and social media (through blogs and videos). The coverage is often sensationalist, because consumers are more likely to read sensational stories, and this generates higher advertising revenues. The coverage can also be very biased, and express opinions rather than facts. Many of the commentators are not qualified to comment. Media pieces regularly feature the opinions of pressure groups, such as Trade Unions, or environmental lobbying groups, or industry representatives, who do not have an objective view.

Some topics will receive a great deal of media attention. The greater the media attention, the more it is likely to negatively influence public opinion, even if the core message of the media is incorrect. The more frequently a lie is repeated, the more likely people will believe it.

Local neighbourhoods are often "forgotten" when it comes to health and safety. The areas directly are around the organisation can be made up of other industrial organisations, countryside or built-up areas with schools and residential areas. The organisation needs to consider the impact of its activities whatever the neighbourhood is. Many organisations now get actively involved with local neighbourhoods as part of their activities to bridge the gap between them. The more the organisation can connect with the local community the better the public opinion is likely to be.

Things to consider are:

- Traffic - increased noise, road use, responsible drivers
- Any emissions that could adversely affect the neighbourhood
- Emergency situations such as fire, explosion, or chemical leaks
- Local involvement



## 2.2: Leadership

### The Meaning of Safety Leadership

Health and Safety performance is driven by the leadership of the organisation. Leaders establish values, develop procedures, and delegate responsibility for implementing the health and safety programs. Put another way, health and safety leaders set the standards of behaviour within their companies. An effective health and safety leader also motivates his or her co-workers to strive for minimal risk exposure.

### What is Health and Safety Leadership?

Health and Safety leadership may be defined as: *"the process of interaction between leaders and followers, through which leaders can exert their influence on followers to achieve organisational safety goals"* (select International.com).

The HSE also gives information on good health and safety Leadership and describes a good health and safety leaders as someone who: *"makes a positive impact on attitudes, behaviours and organisational performance."*

The terms 'leadership' and 'management' are used together but it is important to understand the difference. Some of the key differences are listed below - further information of these differences is widely available:

Leader	Manager
Creates vision and looks to the future	Goal orientated with specific timescales
Encourages and embraces change and innovation	Sets specific aims and objectives within set parameters
Takes risks	Controls risk
Builds relationships	Relies on proven systems and processes
Encourages and coaches people	Gives directions and instruction
Motivates and inspires workers to overcome barriers	Monitors situations and applies effective systems
Encourages innovation	Prefers familiarity, order, and efficiency
Adapts to changing circumstances	Ensures standards are met

Specifically, managers exist as part of the organisation's structural hierarchy and exert formal influence over their subordinates, while leadership is where an individual exerts influences workers by setting an example of appropriate behaviour to achieve shared goals and effect positive change in the organisation. Certainly, one individual can be both a manager and a leader, but only if an individual can consciously perform both roles at different times.

Now that we have clarified this distinction, it should be evident that *any individual in the organisation can be a health and safety leader if they so choose to be*. It is crucial for organisations to have health and safety leaders in every area across levels of the structural hierarchy if they want to create a strong health and safety culture that leads to improved health and safety performance. In fact, senior management may not be the most knowledgeable about the present dangers of a job. Thus, management should impress on their workforce that a health and safety leader is anyone who cares enough about the organisation to take the actions that will keep themselves and others free from danger or injury through guidance, persuasion, direction, and setting the example. Health and safety leaders do not influence others through power, status, or authority. They consider safety in all of their decisions and inspire their co-workers to do the same *through their actions*.

Health and safety leadership is important in many areas of occupational safety and health. First of all, leaders should ensure that a good and functional management system is in place, integrating all possible health and safety aspects in a structured approach. Management systems are most effective when communicated within the whole organisation. The success of occupational safety and health management is therefore also based on the leaders' ability to develop and transpose visions and strategies into specific aims and objectives that can be implemented, monitored, and measured.



### **Types of Health and Safety Leadership, their advantages, disadvantages, typical behaviours, and likely impact on safety performance**

There are various types of leadership style. They include:

- Transformational leadership
- Transactional leadership
- Authentic leadership
- Resonant leadership

#### **Transformational Leadership**

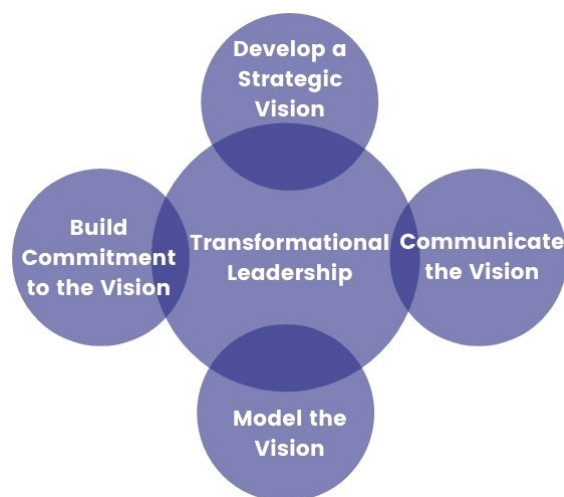
Transformational leadership builds on the transactional approach with more emphasis on its influencing worker behaviour. This style of leadership focuses on motivating, inspiring, and encouraging workers to improve their performance. In academic literature, transformational styles of leadership are characterised by behaviours reflecting:

- Idealised influence (articulating a vision for the future)
- Inspirational leadership (aspiring to attain a realistic goal)
- Intellectual stimulation (challenging assumptions and traditional methods)
- Individualised consideration (awareness and support of individual workers' needs)

In other words, these behaviours relate to inspiring workers with the leader's vision of the future, role-modelling, encouraging teamwork and goals, demonstrating high performance expectations, providing encouragement and support, increasing workers' awareness, and stimulating workers to rethink again about how work can be performed.

Through research, you will find that many believe transformational leadership is more proactive than other forms of leading. It has been associated with increased positive outcomes such as personal worker achievement, innovation, and better overall performance.

Based on findings such as these, it is reasonable to see why organisations might strive to attain this type of transformational leadership in their management. However, one of the disadvantages is a potential lack of accountability or disciplining instances of non-compliance. Where health and safety is concerned, there needs to be a set system of managing controls and risks to which workers can be held accountable and if badly implemented, this leadership style can "blur the lines" of responsibility and conformance. However, in the right situation, this style will encourage workers to think beyond the set parameters and strive to improve systems and health and safety performance using innovation in managing risks.



### Transactional Leadership

Transactional leadership is similar in the way a manager would operate. It is defined by an exchange between the leader and the follower. Both parties fulfil their roles and receive something in return. Three dimensions of this style of leadership are:

- Conditional reward (leaders reward employees for approved behaviours and discipline behaviours that is not).
- Active management by exception (monitoring of performance with intervention where needed).
- Passive management by exception (correction from the leader only when a problem arises).

Transactional leaders place importance on detailed and short-term goals following set rules and procedures. They do not encourage workers' creativity or new ideas. This kind of leadership style may work well in smaller organisations or where organisational issues are simple and clearly defined. Such leaders tend to dismiss ideas that do not fit with existing plans and goals.

The transactional leader is effective in guiding decisions aimed at cutting costs and improving productivity. They tend to be highly directive and action-oriented but their relationship with the workers is not based on emotional bonds and relationships may not become established.

The theory assumes that workers are motivated by simple rewards. The only 'transaction' between the leader and the followers is practical recognition (such as salary, bonus, etc.) that the followers receive for their compliance and effort.

Transactional leadership is useful in health and safety management to some extent because the transactional leader will articulate clear safety rules to follow and reward compliance or punish non-compliance with these rules.

It is generally considered that leadership styles such as this, which focus on rewards or the threat of their removal, suppress workers' true commitment to quality and productivity. The workers are only motivated through reward and punishment. They do not fully engage or agree with the rules or procedures they are required to follow. If the transactional leader is absent, workers may begin to ignore the rules and procedures. In health and safety this can be damaging and dangerous. Furthermore, the transactional leader will struggle to properly involve workers in discussions and decisions concerned with health and safety. Workers will be reluctant to suggest new ways of managing risks. Their creativity is suppressed.

### **Authentic Leadership**

Authentic leadership has been defined as:

*"A pattern of leader behaviour that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development."* (Walumbwa et al. 2008).

Authentic leaders have a positive outlook on life and are honest and open in their dealings with others. They build up a trust with their subordinates, generate enthusiasm for work activities which fosters effective individual and team performance.

Research suggests that there are four key components to authentic leadership:

1. Self-awareness
2. Relational transparency
3. Balanced processing
4. An internal moral perspective

An authentic leader shows *self-awareness* by reflecting on their own strengths, weakness, and values. An authentic leader recognizes their limitations.

When authentic leaders demonstrate *relational transparency*, they freely share their own thoughts and beliefs to followers, whilst maintaining a good emotional balance.

Authentic leaders are *balanced in their approach* because they listen to opinions from subordinates. They welcome opposing viewpoints and consider the value of these viewpoints in a fair manner.

Authentic leaders also display a strong *moral code* that they demonstrate in their relationships and decision-making.

### Resonant leadership

Based on an idea popularised by psychologist Daniel Goleman's book ("Emotional Intelligence", 1996), resonant leadership is based on emotional intelligence that leaders use to direct their feelings to help a group meet its goals.

Resonance may be considered to be the ability to relate to one another. Resonant leadership can adjust the needs to a team of people. David Coleman considered that emotional intelligence (EQ) is much more important than skills and IQ.

Successful leadership is about the relationship that a leader has with his team. Resonant leaders have a higher degree of EQ and the ability to connect with their teams. Their employees trust them. Leaders build unity within a team and motivate employees to follow a goal, even when the situation is highly stressful.

### Behavioural Attributes of an Effective Leader

Leaders must understand the range of health and safety risks in their organisation and give proportionate attention to each of them. This applies to assessing the risks, implementing controls, supervising, monitoring and discipline.

There are seven key safety leadership characteristics and associated behaviours that an effective leader must have:

- **Credibility:** What leaders say is consistent with what they do.
- **Action orientation:** Leaders act to address unsafe conditions.
- **Vision:** leaders communicate their vision for safety excellence within the organisation.
- **Accountability:** Leaders ensure workers take accountability for safety-critical activities.
- **Communication:** Leaders should communicate effectively i.e. listen as well as direct. This helps to maintain a positive health and safety culture.
- **Collaboration:** Leaders need to encourage worker participation in resolving safety issues and recognise individuals' input to promote ownership of those issues and therefore loyalty.
- **Feedback and recognition:** Recognition that is prompt, certain, and positive encourages safe behaviour.

### Credibility

Credibility can be viewed as a quality a person might attribute to another after observing their behaviour. Leaders begin developing trust by acting in ways that provide benefits to their employees. A leader's competence alone, while necessary to enabling the development of trust, does not result in trustworthiness. Trust is extremely difficult to gain and very fragile; once lost it can be hard to recover. Behaviours related to trustworthiness include:

- Admitting mistakes to self and others.
- Treating others with respect and dignity.

- Giving honest information about safety performance, even if it is not well received.
- Asking for ideas on how to improve performance.
- Following through on commitments.
- Acting consistently in any setting and applying safety standards.
- Being willing to make safety related decisions that are unpopular.
- Demonstrating personal concern for well-being of workers.

### **Action Orientation**

A leader's role is not only to direct work and monitor compliance with rules and regulations. A leader encourages suggestions, motivates their staff, and engages with the workforce to solve safety issues. Leaders must be proactive rather than reactive in addressing issues and give timely meaningful responses to safety concerns, demonstrating a sense of personal urgency and energy to achieve results.

Some behaviours related to action-orientation:

- Integrating safety into business planning and decision making, and challenging business decisions that may negatively impact upon risks now or in the future.
- Intervening during day-to-day activities whenever safety requirements may not be met.
- Knowing the significant operational hazards and how they are being managed.
- Leading or actively participating in safety meetings, audits, incident investigations and incident investigation reviews, programs, and campaigns.
- Acting as a role model for reporting safety issues and near-misses.
- Actively sharing lessons learned, following up on closing actions, and verifying effective implementation.
- Creating opportunities to talk to workers about safety rules and their concerns. Making visible worksite visits to stay informed about the reality at the worksite level.
- Supporting workers in their obligation to stop work when safety risk is considered unacceptable.

### **Vision**

To create a strong Safety Culture in the organisation, management need to be able to "visualise" what excellent safety performance looks like and communicate this vision in a compelling way.

The very essence of leadership is having a vision:

- The vision is the foundation on which an organisational strategy is built.
- A vision focuses on an organisational purpose: What are we here to do?

The vision also reflects the values and the beliefs about how these purposes should be achieved. Words are used to build a shared vision and to get the message across to other members of the organisation, but actions are most important. This includes demonstrating a willingness to consider and accept new ideas, encouraging people to consider the impact of their actions on others, and using the safety vision and values to challenge and inspire people.

Some behaviours related to vision:

- Recognising the gap between the present situation and the vision.
- Taking accountability for the vision through actions.
- Engaging others to relate their daily activities to the vision.
- Articulating the vision clearly and forcefully on every appropriate occasion

## Accountability

A strong Leader establishes an effective accountability system covering every position in the organisation. The accountable person:

- Is the one who assigns the work to the responsible person.
- Is the one who is ultimately answerable for the completion of the task by the responsible person.
- Must measure and evaluate performance of the responsible person's assigned duties against standards.

Some behaviours related to accountability:

- Defining and communicating clear safety roles and responsibilities as well as goals and objectives for their workers against established standards of performance.
- Providing adequate resources and tools to support safety performance (physical resources such as tools, equipment, materials, workstations, facilities. As well as psychosocial resources: workload, schedules, training, relationships, and leadership).
  - Holding employees accountable for safety results, measuring, and evaluating performance:
  - Maintaining a strong focus on performance management.
  - Regular reviewing of employees' performance against set goals and follow up on actions.
  - Using informal and formal observation when measuring behaviours at the worksite.
  - Detecting and correcting undesirable behaviours and poor performance early.
- Reinforcing desired performance:
  - Providing constructive feedback to employees on their behaviours and performance. To be effective and increase the frequency of desired behaviours, feedback must happen soon, be certain, significant, and sincere.
  - Including behaviours and performance in decisions about performance rewards, recruitment, and promotions.
  - Celebrating and rewarding successful safety performance.

## Communication

The way leaders communicate helps to create and maintain the Safety Culture of the organisation and has a noticeable impact on performance. In simple terms, leaders influence the behaviour of their teams by communicating their expectations for safety and then explaining how they and their teams will be held accountable for their behaviour. Effective communication is a two-way process that involves sending a clear, unambiguous message and obtaining feedback that that message was received and understood.

Some behaviours related to communication:

- Clearly explaining what is expected of each individual and how that relates to the wider safety vision and objectives of the organisation. Safety should be communicated as a value, not as a priority to be traded off against cost and schedule.
- Giving regular feedback and coaching on individuals' performance. A leader's timely, honest, and constructive feedback enables individuals to improve. The leader can set the boundaries of what is and what is not acceptable.
- Recognising individuals and showing appreciation for a job done safely, to ensure that the positive behaviour is repeated. Leaders should ask to hear about any concerns or challenges that the individual sees as



preventing their safe working and commit to helping them address those challenges. The leader needs to follow up on that commitment or they risk losing trust.

- Giving feedback to the team on how they are performing against expectations, recognising success, but also addressing areas that need improvement.
- Communicating effectively to help the team understand the safety objectives and the strategy of the organisation, and why it is important that they play their part and work safely.
- Providing opportunities for the team to get involved and gain real ownership of safety challenges and solutions.

## **Collaboration**

Collaboration simply means working together. Leaders who encourage teamwork, and who ask for, and act upon, others' input in resolving safety issues, create a greater sense of ownership. A strong Safety Culture is one where people feel naturally motivated to work safely. They do the right thing even when no-one is looking. By encouraging collaboration leaders can help to create a culture that encourages real motivation.

Some behaviours related to collaboration:

- Asking for, listening to, and showing that one values others' views.
- Being open and honest about performance.
- Showing a genuine concern for others' well-being.
- Encouraging the team to discuss safety concerns amongst themselves.

## **Feedback and Recognition**

Providing feedback and recognition for individuals and teams is a powerful tool for encouraging safe behaviour (and discouraging unsafe behaviour) and building a stronger Safety Culture. People need regular feedback and coaching on their performance. Timely, honest, and constructive feedback enables individuals to improve. Giving feedback is not simply telling people what you think of them, this can end up feeling like personal criticism and is very negative. Feedback should be based on indisputable facts.

Whilst feedback is best given on a one-to-one basis, recognition can also be public. The individual needs to be able to link the positive aspects of the recognition to the behaviour they have demonstrated, and this works best when it is close to the event (soon), and the individual believes that recognition is consistently applied (certain). In this context, recognition does not mean financial reward schemes, it means leaders being prepared to identify individuals who have demonstrated safe behaviour (e.g. they stopped the job when they thought it unsafe) and to recognise them in front of their peers. Leaders should also recognise team behaviour as this encourages collaboration and team ownership of safety issues (positive).

Some behaviours related to feedback and recognition:

- Focusing on the behaviour, simply describing what the person is doing and what has been observed, not faults in the individual.
- Describing the impact that the behaviour has, or could have, on others, and the possible consequence for them, their colleagues, or the wider organisation.
- Congratulating people for their safe behaviour.
- Involving people in new and exciting projects.

## 2.3: Consultation

### **The role of consultation within the workplace (with reference to ILO Occupational Safety and Health Convention C155 (Article 20) and ILO Occupational Safety and Health Recommendation, R164)**

Consultation is the process by which organisation management and workers (or their representatives) jointly examine and discuss issues of mutual concern. It involves seeking acceptable solutions to problems through a genuine exchange of views and information.

In addition, Article 20 of ILO Occupational Safety and Health Convention C155 states:

*"Co-operation between management and workers and/or their representatives within the undertaking shall be an essential element of organisational and other measures taken in pursuance of Articles 16 to 19 of this Convention".*

This is supported by ILO Recommendation R164, 12.1, which states:

*"The measures taken to facilitate the co-operation referred to in Article 20 of the Convention should include, where appropriate and necessary, the appointment, in accordance with national practice, of workers' safety delegates, of workers' safety and health committees, and/or of joint safety and health committees; in joint safety and health committees' workers should have at least equal representation with employers' representatives."*

Consultation with workers on health and safety is vital to ensure health and safety is managed effectively. It requires employers to bring to their attention any issues or concerns that relate to the health, safety, and welfare of all workers. Consultation helps promote a positive health and safety culture and ensures that everyone is given an opportunity to influence health and safety policies and procedures. Without co-operation between employers and workers, the chances of managing health and safety effectively are reduced.

Everyone can be affected if such communication fails, and the chances of things going wrong are increased. There are many examples where failure to consult and communicate has led to serious accidents.

### **What is Consultation?**

Consultation on health and safety is simply a two-way process between you and your workers where you:

- Talk to each other about issues.
- Listen to their concerns and raise your concerns.
- Seek and share views and information.
- Consider what workers say before you make decisions.

Communication and consultation are the most basic forms of worker involvement in health and safety management. It is crucial that organisations get them right, not only because the law may require this but because they form the foundation for fully engaging your workforce to achieve the type of changes in behaviour in managers and workers that will lead to safer and healthier workplaces.

Consultation and workforce involvement is not something you should be daunted by or discouraged about. It does not have to be lengthy and bureaucratic. If you have a small business, consultation can be an informal process of talking to your workers regularly and considering their views when you take decisions about health and safety. It can sometimes be more effective to have a simple process rather than something overly complicated.

There are several ways that organisations can consult workers. Consultation can be informal or formal. Methods include:

- Face to face, directly with individuals. Including formal and informal discussions
- Indirectly with workers
- With worker representatives

### **Formal Consultation**

#### **Appointment of Worker Representatives and their Functions**

If organisations choose (or in some cases are required by law) to appoint worker safety representatives, ILO Occupational Safety and Health Recommendation R164 requires:

*"Workers' safety delegates, workers' safety and health committees, and joint safety and health committees or, as appropriate, other workers' representatives should:*

*(a) be given adequate information on safety and health matters, enabled to examine factors affecting safety and health, and encouraged to propose measures on the subject.*

*(b) be consulted when major new safety and health measures are envisaged and before they are carried out and seek to obtain the support of the workers for such measures.*

*(c) be consulted in planning alterations of work processes, work content or organisation of work, which may have safety or health implications for the workers.*

*(d) be given protection from dismissal and other measures prejudicial to them while exercising their functions in the field of occupational safety and health as workers' representatives or as members of safety and health committees.*

*(e) be able to contribute to the decision-making process at the level of the undertaking regarding matters of safety and health.*

*(f) have access to all parts of the workplace and be able to communicate with the workers on safety and health matters during working hours at the workplace.*

*(g) be free to contact labour inspectors.*

*(h) be able to contribute to negotiations in the undertaking on occupational safety and health matters.*

*(i) have reasonable time during paid working hours to exercise their safety and health functions and to receive training related to these functions.*

*(j) have recourse to specialists to advise on particular safety and health problems.*

Worker representatives can be selected by the organisation. However, it is helpful that the representatives volunteer for the role. There is no benefit to nominating an unwilling representative. The representative may be an existing Trade Union representative, in which case the Health and Safety representative will complement their existing role. Representatives can also be elected by the workforce if the organisation decides to arrange these elections.

To learn more about what a worker representative does, it is useful to look at the UK approach to the role and functions of worker representatives.

Representatives have few or no "responsibilities" or "duties". They do however have rights. There is no duty for the representatives to manage health and safety or inspect the workplace. But they do have the right to inspect the workplace and represent the workers on health and safety matters.

In the UK, employers are required to consult on:

- The introduction of any measure which may substantially affect workers' health and safety, e.g. the introduction of new equipment or new systems of work.
- Arrangements for getting competent people (Health and Safety Professionals) to help them comply with health and safety laws.
- The information you must give your workers on the risks and dangers arising from their work, measures to reduce or get rid of these risks, and what workers should do if they are exposed to a risk.
- The planning and organisation of health and safety training.
- The health and safety consequences of introducing new technology.

The functions of worker representatives are:

- Represent workers generally and when you consult them about specific matters that will affect the health, safety, and welfare of the workers.
- Represent workers when Health and Safety Inspectors from enforcing authorities consult them.
- Investigate accidents, near misses, and other potential hazards and dangerous occurrences in the workplace.
- Investigate complaints made by a worker they represent about their health, safety, or welfare in the workplace.
- Present the findings of investigations to the employer.

- Inspect the workplace.
- With at least one other appointed representative, request in writing that you set up a health and safety committee.
- Attend Health and Safety Committee meetings as a representative of your workers.

### **Health and Safety Committees**

A health and safety committee is a means of giving organisational management and workers (or worker representatives) the opportunity to discuss and consult on workplace health and safety matters.

In some countries, it is a legal requirement to establish a health and safety committee.

To be effective a health and safety committee should have:

- The right number and mix of members (management and workforce).
- Adequate authority to endorse decisions.
- A set agenda.
- The most senior person chairing the meeting.
- Have good communications to and from the workforce.
- Minutes to identify actions and action parties.
- Regular meetings, without unnecessary or regular cancellations or delays.

The functions of a safety committee will include:

- Monitoring progress with health and safety objectives.
- Monitoring, and reviewing when appropriate, health and safety policy.
- Reviewing accident and ill-health trends.
- Considering issues arising from monitoring (such as audits or inspection reports).
- Considering reports from enforcing authorities.
- Assisting in the development of health and safety rules and procedures.
- Reviewing workplace changes, or changes in law, that might affect health and safety.
- Considering health and safety training programmes.

### **Direct Consultation with Workers**

In some circumstances, it may be more appropriate for the organisation to consult with each worker directly. This can be more time-effective for smaller organisations or small teams. Again, there are different ways of consulting directly.

- Staff surveys can be useful in consulting your workforce, although a lack of trust can undermine surveys and reduce the return rate. Consider the literacy or language skills of the workers to make sure they can answer questions they understand. Surveys should be anonymous to ensure that truthful answers are given.
- Alternatively, all workers can be consulted in a group meeting, or individual one to one meetings.

### **Informal Consultation**

There are several informal ways that organisations can consult with workers. These include:

- Set up discussion groups to tackle specific health and safety issues and explore ways of making a difference. The workers involved in the group should be directly involved with the issues being looked at so they can really contribute to solutions.
- Arrange safety circles where you have short talks on specific health and safety issues that show the relevance of a topic to particular jobs. For example, a talk about manual handling for those doing jobs that involve lifting heavy goods. It allows you and your workers to explore the risks and think about ways to deal with them.
- Have health and safety as a standing item (ideally the first item) on the agenda of departmental meetings where workers' views can be fed back to you, and so there is always an opportunity for health and safety issues to be discussed.
- Regular walkabouts whereby senior managers can meet workers face to face, and they get to share ideas and concerns. If managers are regularly approachable, workers are more likely to be open about the risks, especially if something is then done about the issues raised.
- Special workforce meetings can be best when you need to call the whole workforce together for their views and opinions. This could be in addition to regular team meetings. At large meetings, the exchange of views and ideas might not be as effective as in smaller gatherings where people may feel more comfortable sharing their views.
- Email and web-based forums allow the organisation to send out news, suggestions, and proposals to large groups of people. In return, workers can respond with feedback. Using web-based discussion forums or social media outlets can generate large amounts of discussion where many workers express individual views and suggestions.

## **The four stages to consultation (ref: "Involving your workforce in health and safety", UK HSE HSG263)**

### **1. Getting started: Prepare**

Accident rates are lower where employees genuinely feel they do have a say in health and safety matters than in workplaces where employees do not get involved.

Stronger employee involvement means better control of common workplace risks such as slips and trips – it has been shown to be very effective in 76% of cases where employees felt they were always consulted but only very effective in 40% of cases if they thought they were rarely, or never, consulted.

Employers can learn about the risks through consultation – the risk of stress and slips and trips occur practically everywhere, but awareness of them is higher where there is employee involvement (62%) compared to where there is no involvement (28%)

Research has also shown that workplaces with health and safety committees where some members are selected by (trade) unions have significantly lower rates of work-related injury than those found in workplaces with no co-operative health and safety management.

Aside from any legal duty to consult, workplaces where employees are involved in taking decisions about health and safety are safer and healthier. Employees influence health and safety through their own actions. They are often the best people to understand the risks in their workplace.

A workforce that feels valued and involved in decision-making plays a big part in a high-performing workplace. Empowering your workforce, giving them the right skills, and getting them involved in making decisions shows them that you take their health, safety, and wellbeing seriously. They not only raise concerns but offer solutions too.

Employees are more likely to engage and believe in consultation when senior managers show personal and long-term commitment and listen to the views of employees because they want to hear what the workforce has to say. Real belief in the benefits of involving your workforce creates co-operation as well as complying with any legal duty.

## **2. Get organised: Plan**

When planning how best to involve your employees, you need to consider the following factors about the business, the workplace and the workforce that will have an impact on how you can engage your employees. This includes:

- The structure of the business
- The management style
- Organisation and safety cultures
- Trade union recognition/employee relations
- Size of workplace
- Location of sites
- Types of work done
- Degree and nature of inherent dangers
- Size and diversity of workforce
- Employment structures (e.g. direct employees, agency, and contract workers)
- Work patterns (such as shift systems, part-time)

These factors will affect whether you consult individuals or representatives, the methods you use, organisation of inspections and investigations, and co-ordination between committees, among other things. Matters for consultation should include:

- Any change which may have a substantial effect on your workforce's health and safety. Such changes may include new or different procedures, types of work, equipment, premises, and ways of working (e.g. new shift patterns).
- Your arrangements for getting competent people to help you meet your obligations under health and safety laws, for example the appointment of a health and safety manager.
- Information to be given to your workforce on the likely risks in their work and precautions they should take.
- The planning of health and safety training.
- The health and safety consequences of introducing new technology.

There is generally no legal set time limit, but organisations should consult in good time. This means there has to be enough time to explain the issues to employees, time for them to consider and get back to you with informed responses, and time for you to take into account their response before you make a final decision.

How long the consultation process takes will largely depend on the complexity of what you are asking the workforce to consider, how many people you are consulting, and methods of consultation. A simple issue where you need to consult a smaller number of representatives can probably be dealt with in a few days or addressed routinely through regular channels of consultation. A technical matter requiring time for consideration, or consulting an entire large workforce, is likely to require longer.



### 3. Get it done: consult and involve

You can use a range of methods to suit the circumstances and use a combination if a single method is not suitable. Whatever method you choose, you need to ensure it complies with your duties. For example, if you choose to consult with employees directly, you need to make sure it is practical, otherwise you must consult with representatives. There are various ways you can consult with employees face to face:

- **One-to-one discussions** can be particularly effective if you have a small business and have the opportunity to talk to your employees regularly.
- If your business is larger, then you could try **regular walkabouts** where you get to meet employees face to face, and they get to share ideas and concerns. If you are regularly approachable, employees are more likely to open up about the risks, especially if you then do something about the issues raised.
- Have **health and safety as a standing item** on the agenda of routine team meetings where your employees' views can be fed back to you, and so there is always an opportunity for health and safety issues to be picked up.
- **Special workforce meetings** can be best when you need to call the whole workforce together for their views and opinions. This could be in addition to regular team meetings. At large meetings, the exchange of views and ideas might not be as effective as in smaller gatherings where people may feel more comfortable sharing their views.
- Arrange **toolbox talks** where you have short talks on specific health and safety issues that show the relevance of a topic to particular jobs, for instance a talk about manual handling for those doing jobs that involve lifting heavy goods. It allows you and your workers to explore the risks and think about ways to deal with them.
- Set up **work groups** to tackle specific health and safety issues and explore ways of making a difference. The employees involved in the group should be directly involved with the issues being looked at so they can really contribute to solutions.

Many organisations form health and safety committees as a means of consultation. Made up of employee representatives, union-appointed representatives, management, and health and safety professionals a health and safety committee generally considers standing items which include:

- Statistics on accident records, ill health, and sickness absence.
- Accident investigations and subsequent action.
- Inspections of the workplace by enforcing authorities, management or employee health and safety representatives.
- Risk assessments.
- Health and safety training.
- Emergency procedures.
- Changes in the workplace affecting the health, safety, and welfare of employees.
- Adequacy of health and safety communications and publicity in the workplace.

### 4. Get it right: keep on improving

Once you have been consulting and involving your employees for a while and given each other time to adjust to the processes you have set in place, you should start thinking about how to keep improving over time. Realistically, there are likely to be some things that work really well, others that could work better, and some things that need to be

approached in a different way. This is not something to worry about as things are rarely perfect at the first attempt. Even when some things are working well, changes over time may mean they do not remain effective.

For effective employee engagement, you need to keep monitoring performance and reviewing progress regularly with your workforce and employee representatives. It allows you to continue improving the way you work together to enhance health and safety. You can also explore what others in your industry or similar businesses do to find out what works and share experiences of successful measures.

## **Behavioural aspects associated with Consultation**

### **Peer Group Pressure**

Peer pressure (or social pressure) is influencing a peer group, observers, or an individual exerts that encourages others to change their attitudes, values, or behaviours to conform to those of the influencing group or individual. These informal groups (such as a closely-knit shift team) can play a powerful role in hindering the consultation process (by negatively influencing the views of their elected representative) and of health and safety in general. Conversely, they can positively influence the worker representative by encouraging him/her to be direct in discussions at a meeting with management.

### **Danger of Tokenism**

Tokenism means making a symbolic, or token, gesture. For example, recognising the appointment of worker representatives to a safety committee, but ignoring their views. Consultation is about management listening to and discussing the views of workers. If consultation is seen to be nothing but a token gesture, then resentment and apathy within the workforce may lead to deteriorating standards of safety. Whilst it is always the right of management to make decisions, even after consultation, reasons should be given for those decisions.

### **Potential Areas of Conflict**

There are inevitably occasions where there will be a conflict of interest. For example, the case of a worker representative who may, in addition to representing workers on health and safety, may also be representing a trade union. In such cases, if union and organisation management are in conflict, the actions of the worker representative in the Health and Safety Committee may be more "management beating" than constructively looking at safety-related issues and solutions.

## **The Role of the Health and Safety Professionals in the Consultation Process**

Health and Safety Professionals play a key role in ensuring that leaders, managers, workers, and Worker Representatives are educated and supported to understand their responsibilities under the national laws and organisational health and safety standards and procedures. The Professional will arrange for any necessary training to be provided to representatives and others who take part in the Health and Safety Committee meetings.

The success, or otherwise, of any business largely depends on its workforce and the relationship between senior leadership, managers, workers, and worker representatives. Health and safety professionals are a key link in building and maintaining healthy partnerships in the workplace and supporting all facets of the business to achieve positive health and safety outcomes.

A key aspect of the health and safety professional's job is to facilitate, and get involved in, health and safety consultation, through interaction with managers, workers, or worker representatives. This can be aided by:

- Attending health and safety committee meeting to offer expert advice.
- Arranging for the latest health and safety news to be displayed on prominent notice board(s).
- Circulating progress on health and safety objectives for discussion.
- Discussing with workers, and their representatives, health, and safety issues in the workplace.
- Encouraging managers to make health and safety agenda priority at team meeting.

## 2.4: Health and safety culture and behavioural change programmes

### The Meaning of Health and Safety Culture and Health and Safety Climate

#### Culture

Safety culture has been defined as: "the attitude, beliefs, perceptions, and values that workers share in relation to safety in the workplace and is linked to organisational culture".

The UK HSE have the following definition: ***"The product of individual and group values, attitudes, competencies, and patterns of behaviour, that determine the commitment to, and the style and proficiency of, an organisation's health & safety programmes. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventative measures"***. However, culture can probably be best understood as *"the way we do things around here"*.

Culture forms the context within which people judge the appropriateness of their behaviour (in other words "what people do") An organisation's culture will influence human behaviour and human performance at work. Poor safety culture has contributed to many major incidents and personal injuries.

An organisation's culture can have as big an influence on health and safety outcomes as the safety management system. 'Safety culture' is a subset of the overall organisational or company culture. Many companies talk about

'safety culture' when referring to the inclination of their workers to comply with rules or act safely or unsafely. However, we find that the culture and style of management is even more significant, for example a natural, unconscious bias for production over health and safety, or a tendency to focus on the short-term and being highly reactive. Success normally comes from good leadership, good worker involvement, and good communications.

### **Climate**

Climate, on the other hand, could be described as something more surface level and relates to the here and now. It has more to do with the mood or prevailing atmosphere within the business. In other words, "how people feel right now". The climate is prone to more short-term fluctuations and is determined by many factors which include leadership, structure, rewards, and recognition.

### **Organisational culture and how it interlinks with health and safety culture**

A poor culture encourages an atmosphere where not complying with safe working practices is acceptable, and it doesn't help the organisation to take effective action to solve health and safety problems. Quite often, organisations that have a poor safety culture can have the same underlying attitude to all process and procedures. This can result in poor product quality and financial control as well as poor health and safety.

Many companies talk about 'safety culture' when referring to the inclination of their workers to comply with rules or act safely or unsafely. However, we find that the culture and style of management is even more significant, for example a natural, unconscious bias for production over safety, or a tendency to focus on the short-term and being highly reactive.

Symptoms of poor cultural factors can include:

- Widespread, routine procedural violations. For example, not wearing of PPE
- Failure to comply with the company's own SMS (Safety Management Systems (although either of these can also be due to poor procedure design)).
- Management decisions that appear consistently to put production or cost before safety.

### **Indicators of health and safety culture**

The 2001 UK enquiry report into the Ladbroke Grove rail crash (where 31 people died and over 500 injured) identified five critical indicators of health and safety culture:

- Strong, visible leadership
- Two-way communication
- Staff involvement
- The existence of a learning culture
- The existence of a just culture

### **Leadership**

Ladbroke Grove report:

*"Clear and decisive leadership is required within individual companies."*

Existing research is clear that leadership must be one of the first priorities for the establishment of a positive safety culture.

The Inquiry into the Ladbroke Grove accident views the importance of safety leadership from two angles:

1. Safety leadership across industry
2. Safety leadership within individual companies

The key message outlined by the report is the importance of a strong management commitment to safety and to demonstrate this dedication to workers at all levels, as well as to the public.

### **Two-way Communication**

Ladbroke Grove report:

*"A key task for management concerns communications and, specifically, communicating to all workers the clearest possible message of their safety goals and objectives."*

If one of the key points to successful health and safety leadership is good visibility of the safety commitment message, then effective communication is paramount. The Ladbroke Grove Inquiry report highlights how effective top-down communication between management and workers is necessary for the development of a positive safety culture.

The objective of this communication is to relay to workers the clearest possible message of safety goals and objectives and transfer important health and safety information. This plays an important part in helping workers to understand the direction of their company, its future and how they form part of the future.

Effective two-way communication between management and staff is considered to prevent perceptions of isolation and thus the development of a separate set of behaviours or culture at the frontline.

The importance of communication within an organisation can be categorised into three main areas: top-down (management to frontline), safety reporting (frontline to management) and horizontal (between peers).

Key indicators of effective communication that have been identified in research literature include:

- Production and visibility of a good health and safety policy statement.
- The use of written and other non-verbal methods of communication to emphasise safety regulations, safety issues, and the importance of safety. Examples of communication methods include verbal, videos, interactive systems, and safety newsletters.
- The communication of major accident risks.
- Provision of management feedback following consultation or involvement of workers.
- Conducting management tours, which is an effective way to pass information throughout the organisation i.e. "walking the job", talking to people, and listening to people.

### **Involvement of Staff**

Ladbroke Grove report:

*"there can be no doubt that, if the rail industry is to reach the level of performance required, highly motivated staff at all levels will be required."*

It is clear that good communication is related to the involvement and participation of the staff in health and safety matters, as well as other aspects of the organisation. This applies to both personal safety and major accident prevention. In particular, there should be active worker participation in risk identification, risk assessment, usability and maintainability assessments to prevent and control hazards. The UK HSE document HSG48 (Reducing Error and Influencing Behaviour) maintains that staff at different levels of the organisation should be involved in identifying hazards, suggesting control measures, and providing feedback, thus leading to a feeling that they 'own' safety procedures. If the workforce feel that they are responsible for their own safety, and that of others, they are likely to feel a sense of involvement within the organisation.

### **The Existence of a Learning Culture**

Ladbroke Grove report:

*"There is a need for the industry to develop further as a learning organisation... the industry should learn the lessons from previous accidents, near misses and the analysis of information regarding the non-compliant behaviour of people and systems; the analysis of behaviour leading to unsafe acts; the incidents in other related industries."*

A learning organisation can benefit from the ideas and concerns of those at all levels of the organisation. Ideally, all workers should be involved in proactively contributing ideas for improvement and are encouraged to become aware of what first class performance in terms of safety means in their jobs. This will facilitate contributions because they want to do so, not because they are told to do so. Schemes which encourage staff to put forward ideas and that provide rewards are important.

Safety culture or climate surveys are usually a questionnaire or interview-based method for obtaining information regarding workers' attitudes, opinions and feelings towards safety, and its management within the organisation. Safety culture or climate surveys are a mechanism for the organisation to monitor the success of initiatives to improve safety culture and to improve worker awareness of and involvement in safety.

### **The Existence of a "Just" Culture (i.e. absence of a Blame Culture)**

Ladbroke Grove report:

*"I (Lord Cullen) recommend to the industry the development of a culture in which information is communicated without fear of recrimination and blame is attached only where this is justified."*

Whilst the presence of a blame culture has many negative effects on learning and worker motivation, there are some cases where the individual making the error deserves some repercussions. Blame should be attributed when it is deserved. Examples may be when there is evidence of gross negligence, misconduct, or deliberate violations of rules.

A balance must be achieved between a 'no-blame' culture and a 'blame' culture. The optimum state is the presence of a 'just' culture, i.e. an atmosphere of trust in which people are encouraged, and even rewarded for providing essential safety-related information. The culture must be 'open', where it is recognised that mistakes will be made, but these must be reported and learnt from.

### **Other indicators**

Other indicators of a safety culture include:

- The level of health and safety knowledge throughout the organisation and the workforce. Organisations with excellent safety culture have workers and managers who are knowledgeable about health and safety since

they are regularly involved, and the topic is often discussed. In organisations with a poor culture, managers and workers will have little or no knowledge of health and safety.

- Better organisations will seek to improve their culture, and this includes writing down their desired cultural vision they aspire to attain.
- Competing priorities. With poor cultures, some priorities are sacrificed at the expense of others. For example, safety comes second to production or cost. In a positive safety culture, not only does safety never get sacrificed, but none of the competing priorities are sacrificed. The involvement of all workers and managers leads to innovative solutions, helping the organisation deliver its services and products safely at minimal cost.
- Visible evidence of financial investment in health and safety. In negative safety cultures, there is often visible evidence of a lack of investment. For example, safety signs and documentation that is out of date, defects on machines, temporary repairs using tape, workers making their own tools or PPE.

## The Measurement of Health and Safety Climate

### Climate Assessment Tools

Health and safety climate assessment tools can be used initially by organisations to establish the level of commitment within the organisation to the health and safety programme. They may be then used periodically to compare against the previous reference point.

Most safety climate or culture tools consist of self-assessment questionnaires. It is possible that this could limit the extent to which safety culture can be measured, as only attitudes, perceptions, or opinions are likely to be obtained. However, some of the toolkits have gone further to incorporate interviews, as well as documentation reviews, to gain a broader, and less subjective understating of what is happening in the organisation.

Within the USA there is a Safety Climate Assessment Tool which is used in the Construction Industry to improve their safety climate.

In the UK, The Health and Safety Laboratory (HSL) developed a Safety Climate Tool (SCT). The SCT uses 40 statements across eight factors to measure safety climate quantitatively within an organisation. The eight factors are:

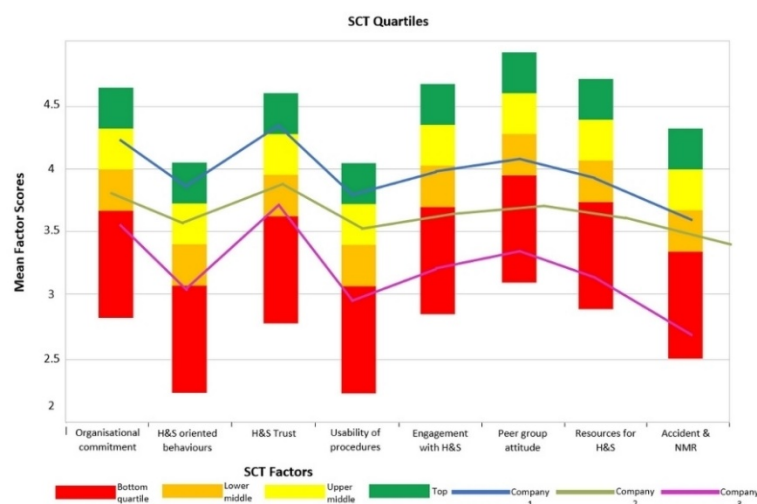
1. Organisational commitment
2. Health and safety orientated behaviours
3. Health and safety trust
4. Usability of procedures
5. Engagement in health and safety
6. Peer group attitude
7. Resources for health and safety
8. Accidents and near miss reporting





The SCT is available in software format, making analysis straightforward. The results are presented in chart or graph format making them easy to communicate to the workforce. The tool is also available in multinational languages, making it easily useable outside of the UK.

Example of one output:



The following case study makes reference to a Climate Survey Tool (CST). This relates to a survey that has now been incorporated into the Safety Climate Tool (SCT).

### Case study: Pilkington Glass, UK

Pilkington is one of the world's largest manufacturers of glass and glazing products for building, automotive and related technical markets. The Group has annual revenues of €4.6 billion, manufacturing operations in 25 countries on six continents and sales in 130 countries, employing around 27,400 people worldwide.

Pilkington's in St Helens is a multi-site operation, employing over 2000 people.

### Reasons for Introducing the Safety Climate Tool

Pilkington Doncaster and Pilkington St Helens were some of the first users of the CST. The organisation wanted a tool to help them measure the impact of a range of activities being undertaken to improve safety. The organisation also wanted to identify areas for improvement and investigate the areas in which a proposed behavioural safety programme would have the most benefit.

### Implementation

Pilkington undertook the CST across the site, from senior managers to frontline workers. In conducting the survey Pilkington did not set a specific time limit on how long it would take to complete. However, from the outset the organisation wanted to turn the information around in the shortest possible time to demonstrate commitment to

the process. To achieve a high response rate (85%), Pilkington provided a brief to participants on what they were doing and why. Arrangements were also made to enable participants to complete the survey in work time. This approach was found to be extremely effective, particularly as previous staff surveys, which had adopted other approaches, received low (30%) response rates.

### **Safety Issues**

At the time of administering the CST, the main perceived area of concern was slips, trips, and falls. The organisation had introduced systems and procedures to reduce these. However, accidents had continued to occur, and the organisation wanted to use the tool to identify any underlying issues that may be influencing accident rates. As a result of using the CST, the organisation had identified certain risk-taking behaviours, which reinforced the view that a behavioural safety programme should be introduced. The CST had also identified that safety communications, which were not seen as an area of concern before the survey was issued, could be improved. Again, action was taken to combat this by improving safety briefings and workshops.

### **Communicating Results**

To aid the rapid communication of results, the organisation used existing safety communication channels (safety committees, team briefs, safety action group meetings, etc.). The organisation also developed a presentation pack for management workshops, which contained the key elements for supervisors and work teams. The organisation found that adopting this approach both helped to convey the results rapidly and helped to share the ownership of the CST results and actions arising out of them.

### **Taking Action**

The actions arising out of the CST were prioritised by the project team and agreed with managers, supervisors, and the workforce. Actions for each of these groups were identified and a rolling safety improvement programme was proposed, starting with the managerial and supervisory grades.

### **Health and Safety Outcomes - Attitudes and Behaviours**

The CST was found to help identify existing attitudes and behaviours towards safety-related issues, for example, the use of PPE (supporting the assumption that, on occasion, gloves were not being worn in the handling of glass).

As a result, the CST became an integral part of a behavioural safety programme which was designed to reduce risk-taking behaviours in conjunction with an external consultancy. The behavioural safety programme, introduced with the assistance of an external consultancy, had a specific emphasis on promoting key safety behaviours (e.g. wearing gloves, holding handrails).

These key safety behaviours were identified partly as a result of using the tool, partly through engaging workers on the results, and partly from engaging the expertise of the external consultancy. The organisation invested resource in promoting the key safety behaviours via posters, 'think safety' cards (providing the key messages using diagrams or pictures together with a check list asking the worker to assess the risks from the task they are about to undertake) and targeted campaigns. These campaigns were linked into both the CST and behavioural safety programme.

## **Worker Participation**

The project team commented that it was difficult to tease out the impact of the CST on worker participation as other activities, particularly the behavioural safety programme which had the specific intention of improving worker participation, had been introduced at around the same time. However, using the CST results to engage workers about safety issues was a strong benefit of using the tool.

## **Lessons Learnt**

In early surveys, the organisation found that some respondents had not categorised themselves correctly as managers, supervisors, or members of the workforce. To aid clarity and to make the CST more applicable to the organisation, Pilkington produced their own guidelines. These guidelines conveyed both the purpose of the CST, what the results meant, and how this linked in with other organisational activities to improve safety. This guide made clear:

- The reasons why the organisation was undertaking a CST.
- That the survey was completely anonymous and could be completed in work time.
- That feedback would be provided after the results of the CST had been gathered.

## **Tips for Others**

Pilkington suggest that organisations using the CST for the first time would be advised to:

- Make clear the reasons why the organisation is undertaking a CST.
- Ensure that the survey is completely anonymous and can be completed in work time.
- Provide feedback soon after the results of the CST have been gathered.
- Target activity in response to CST results and set actions. These actions should be communicated to the workforce.
- Tailor the results, and actions arising out of them, to the manager, supervisor, and the workforce.
- Record data for use in conjunction with future CSTs.

## **Factors that may Promote a Positive Health and Safety Culture and Climate**

In organisations where there is a positive health and safety culture workers have a sense of belonging and are of the view that health and safety matters. There is a clear policy and management system and strong leadership from the top of the organisation. This carries on throughout the management structure, where health and safety is part of the decision-making processes that managers and supervisors go through daily.

Workers behave safely because they want to, and because "that's the way we do things around here".

Workers in the organisation who do not share this view are in the minority. Workers (including new workers, or contractors) who are unable to adapt to this way of thinking may leave the organisation.

The following factors will promote a positive health and safety culture and climate:

- Management commitment and leadership
- High business profile of health and safety
- Provision of information

- Involvement and consultation
- Training
- Promotion of ownership
- Setting and meeting targets

### **Management Commitment and Leadership**

Management commitment produces higher levels of motivation and concern for health and safety throughout the organisation. It is indicated by the proportion of resources (time, money, people) and support allocated to health and safety management and by the status given to health and safety versus production, cost, etc.

The active involvement of senior management in the health and safety system is crucial. This includes setting of health and safety policy and health and safety objectives and targets and ensuring that policy is implemented, and objectives are achieved.

Managers need to be seen to lead by example when it comes to health and safety. Good managers appear regularly on the 'shop floor', talk about health and safety and visibly demonstrate their commitment by their actions, such as stopping production to resolve issues. It is important that management is perceived as sincerely committed to safety. If not, workers will generally assume that they are expected to put commercial interests first, and safety initiatives or programmes will be undermined by cynicism.

### **High Business Profile on Health and Safety**

The culture of an organisation can be enhanced by ensuring that health and safety features prominently in documents and meetings. For example:

- First item on the agenda of internal business meetings.
- As part of an organisation's "mission statement".
- In the Annual report of the organisation.
- As a key requirement when vetting contractors for possible work in the organisation.

From an informal perspective, health and safety may also feature regularly in discussions between managers, and between managers and workers.

### **Provision of information**

In a positive culture, questions about health and safety should be part of everyday work conversations. Management should listen actively to what workers are telling them and take what they hear seriously.

Provision of information on health safety (which, in most countries, is a legal requirement) is vital to ensure that workers are kept informed. Information includes hazards and risks associated with their work together with control measures, emergency procedures, names of worker representatives, learning from accidents, any information relating to changes (such as how things are done, equipment that is defective, new personnel, etc.).

### **Worker Involvement and Consultation**

Active worker participation in safety is important, to build ownership of safety at all levels and exploit the unique knowledge that workers have of their own work. This can include active involvement in accident investigations, health and safety committees, risk assessments, inspections, plant design, for example.

## Training

Training is a key part of the process of ensuring that workers have the competence to carry out their tasks. For example, a lathe operator may have the skills to operate the machine, but may require training on PPE required, and the hazards of any cooling fluid used. Also, workers who receive training may feel more motivated because they are acquiring new skills that may help their future career. Providing training to workers also demonstrates that their professional development, and they as a person, as valued by the organisation. Training also raises awareness and the profile of health and safety across the organisation.

## Promoting Ownership

Organisations who are considered to be "best in class" have one thing in common: each worker (and contractor) takes ownership of their own health and safety. If you were to ask workers in organisations with a poor health and safety culture "who is responsible for health and safety?" the answer will probably be "the safety manager". In high performing organisations, the answer would be "I am!" Better performing companies have health and safety clearly established as a "line-management responsibility" and not the responsibility of the health and safety professional.

By taking ownership of safety, staff are more likely to speak up when they see health & safety issues, correctly report incidents, have a positive attitude towards safety and take new safety initiatives seriously.

### Health and safety ownership can be promoted by:

- **Group identity:** Stressing the importance of working as a "company team" and the need to look out for each other. Staff work towards one safety goal and see one another as family. All talks use inclusive language such as "We're the best at what we do. We can reach our safety goal of no more than 10 incidents a month!".
- **Open and honest:** Studies have found that high performing organisations encourage staff, at all levels, to openly discuss issues and provide feedback to one another on performance. Low candour workplaces are highly politicised, and people are too afraid to speak up. When people trust that they can freely talk about safety risks, then you know that they are being responsible to themselves and others and that you have an open workplace culture.
- **Good Supervisors:** A good supervisor fosters positive safety attitudes and encourages sharing important safety-related information. Various research studies have shown that positive communication relations between supervisors and workers improves safety performance. Having good supervisors that expect people to take ownership of their safety (while providing them support, training, and resources) is empowering.
- **Sharing Safety Stories:** When it comes to changing people's mindsets that "it won't happen to me", the most effective way is to get people who have been injured, to talk about what happened. After all, stories provide an emotional connection to information and can show the effect of when safety is not taken seriously.

## Setting and Meeting Targets

The organisation should set targets for safety performance, along with clear standards on what is acceptable or not acceptable. The targets should be achievable and should not compete with other targets for production or quality. The targets should be set at the highest level of the organisation. This sends a clear signal that health and safety is an equal partner to other organisational priorities.

In addition to setting the targets, management must take active steps to reach them. Target setting must not be a token gesture. Targets should be achievable and achieving them should be the "norm". If the organisation is on track

to miss a target, visible action must be taken to address the situation. If the organisation is seen to do nothing to hit the target, this sends a non-verbal message that the target is not important.

### **Factors that may Promote a Negative Health and Safety Culture and Climate**

A poor culture encourages an atmosphere where not complying with safe working practices is acceptable, and it doesn't help the organisation to take effective action to solve health and safety problems.

In such organisations, there is often a lack of management leadership and direction, and workers may behave unsafely because they don't know any better. There are usually poor (or no) health and safety standards, and accident rates are likely to be high.

Quite often, organisations that have a poor safety culture can have the same underlying attitude to all process and procedures. This can result in poor product quality and financial control as well as poor health and safety. Health and safety is often only one symptom of a wider organisational problem.

The following issues may also contribute to a negative health and safety culture or climate:

- Organisational change and uncertainty.
- Lack of confidence in the organisation's objectives or methods.
- Uncertainty.
- Management decisions that prejudice mutual trust or lead to confusion about commitment.

### **Organisational Change and Uncertainty**

Whenever organisations reorganise or downsize there is a period of uncertainty and upheaval for both the organisation and the workers. Poor communication can lead to rumours of closure or redundancies. Whilst organisations may offer financial packages to make any job losses less painful, there may still be a feeling amongst the remaining workers that further job losses may occur. These can lead to loss of motivation amongst the workforce, mistrust of management, and anger, all of which may have an effect on health and safety (breeding an attitude of "why should we bother?").

Some organisations go through regular periods of change. For example, there may be a high turnover of supervisors, and each new supervisor brings new standards and expectations of how things should be done. In an environment where rules, procedures, and structures are continuously changing, it becomes difficult for any new safety rule to become accepted by the workers. They come to believe that the new procedure will only exist for a short time before it changes again.

### **Lack of Confidence in Organisation Objectives and Methods**

Most companies will have objectives in terms of safety and productivity, including a company safety policy outlining the organisation's commitment to health and safety. If the health and safety policy seen to be "not worth the paper is written on", in other words management don't implement it, or the policy is just a token gesture to comply with the law, or health and safety objectives are seen to be unobtainable (maybe because workers or their representatives had no input into their development) then management credibility is damaged.

Also, if in fact productivity is seen to be pre-eminent over safety, then worker perception will inevitably be that the company is unethical and untrustworthy in its operations, thus leading to a lack of trust and a deterioration of the safety culture.

### **Management Decisions that Prejudice Trust or Lead to Confusion regarding Commitment**

Decisions send a non-verbal message to workers as to what management consider to be important. Decisions can contradict previous communications, and this damages trust. Management can say they are committed to health and safety, but their decisions may send a contradictory message.

For example, a senior manager may stand in front of the workers and say safety is the most important thing for them. But when the workers later request improved PPE that is more comfortable, a refusal from this manager sends the message that he is not committed to safety. From this point on, the workers' trust in the manager is damaged, and they become confused as to whether management is committed to safety or not.

Very small management decisions and verbal cues can also send subtle messages betraying a lack of commitment. For example, an Engineering Manager might tell a maintenance operative to fix a machine before the morning "No matter what it takes". This tells the worker that the safety of the repair is secondary. Another example may be that a senior manager does not wear their PPE in the workplace. This sends the message that rules do not apply to them, or that the rules are not necessary.

### **Changing the culture**

Change is accepted as a universal feature of modern organisational life, but few people (including managers and workers) feel comfortable when change affects them personally. Change can induce stress and tensions in people and make them fearful of it.

Before it is possible to implement any form of change, the processes by which that change are to be implemented should be planned. In general, this can be best done by using a structured plan with appropriate guidelines, clear objectives and tasks, and realistic timescales given to specified individuals.

### **Planning and Communication**

Whilst the planning for cultural change will start at the top of the organisation, participation at all levels should be encouraged. The plan should incorporate the objectives of the change, the means of achieving them, responsibilities for implementing, time and resources required. The plan should also anticipate the likely problems, possible objections, potential impacts on individuals, and actions to mitigate these.

To stop speculation and misunderstanding, information about the change process should be communicated as early as possible, with regular updates as changes get underway.

### **A Gradualist (Step-by-Step) Approach**

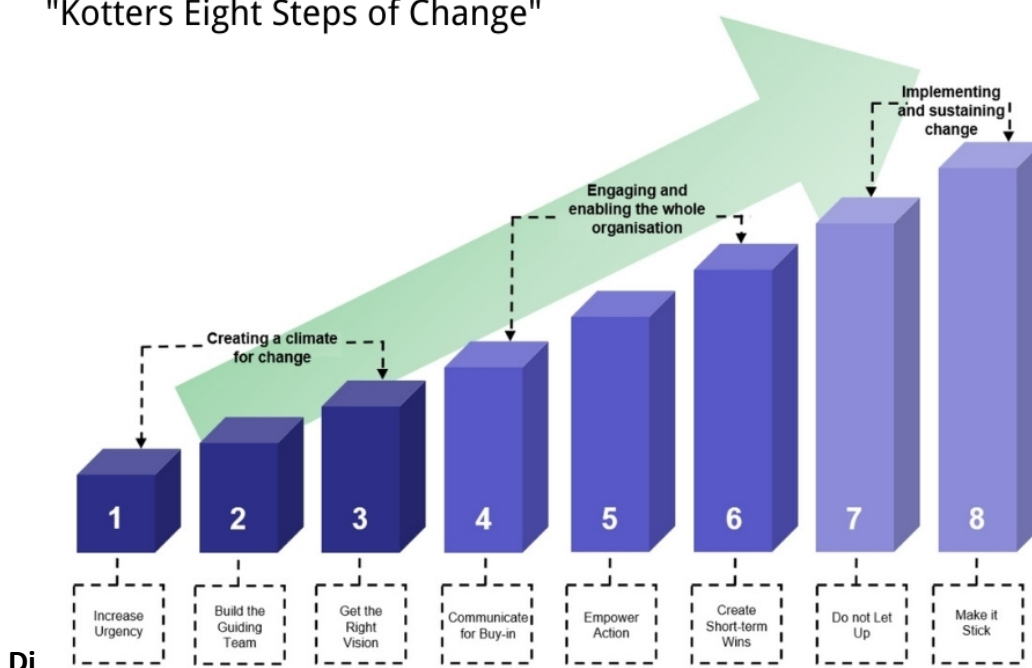
One way to effect change is to adopt a "step-by-step" approach, where changes are gradually introduced over time. It has the advantage of allowing time for the change to be adopted and established. The main disadvantage is that change will take longer to adopt that is desirable.



John Kotter (1996) described an eight-stage change process for managing change in large organisations following his research into US organisations who had failed to manage change effectively:

- Establish a sense of urgency: the need to change.
- Create a guiding coalition: with authority and credibility.
- Develop a vision and strategy: a clear aim and way forward.
- Communicate the change vision: promote understanding and commitment.
- Empower broad-based action: enable people to act and overcome barriers.
- Generate short-term wins: to motivate and ensure further support.
- Consolidate gains and produce more change: maintain change momentum.
- Anchor new approaches in the culture: new values, attitudes, and behaviours.

### "Kotters Eight Steps of Change"



Di

#### Direct

This occurs because of a positive action which is taken with the express purpose of effecting a cultural change in the organisation. In other words, a formal structure set up to work out the process, objectives, and time scales of the change programme.

#### Indirect

Indirect actions are those taken without, as its main purpose of effecting cultural change. For example, health and safety inspections or risk assessments identify health and safety deficiencies in the workplace and corrective actions, which could be people, procedural or processes related, are implemented to correct. Involving workers in the risk assessments is an indirect way of getting them to accept and agree changes to how safety is managed.

#### Strong Worker Engagement

The process of change, like any other health and safety issue, will not be successful without the involvement and commitment of the workforce. The workforce, or their representatives, must be involved at all stages of the process for it to be successful.

### **Training and Performance Measurement**

Cultural change depends on behavioural change. Members of the organisation must clearly understand what is expected of them and must know how to implement change requirements once they have been defined. Whilst training alone cannot change a culture, it can be very useful in both communicating expectations and in teaching new behaviours.

Performance measurement techniques (such as health and safety climate or cultural tools) can be introduced to assess the effectiveness of change and, importantly, periodically the ongoing effectiveness. In addition, traditional measurement tools, such as accident rates, sickness absence rates, and audit findings can be used to assess improvements as a result of the cultural change programme.

### **Importance of Feedback**

As with any improvement programme, feedback is crucial to determine whether any changes that have been successful. Feedback can be from management to workers (for example, on the results of a "culture or climate" survey, or improvements in accident rates) or from the workforce to management, enabling management to review, and where appropriate, modify aspects of the change process.

### **Changes to the work environment**

The workplace environment has a significant part to play in worker performance, productivity and health and safety. Impacts can be both positive and negative. A poor work environment such as one with unsuitable furniture, poorly designed workstations, lack of ventilation, excessive noise, inappropriate lighting, poor standards of cleanliness or housekeeping, poor supervisory support, and poor communication, can adversely affect the morale of workers. Conversely, a pleasant, clean, tidy, and well-lit environment where there is good communication and management/supervisory support can greatly enhance morale, productivity and reduce the chances of errors that could compromise health and safety.

### **Building trust in the workforce**

Critical to improving or driving health and safety culture positively is building trust. When the workforce sees that management is serious about health and safety – by deeds and actions, by showing and demonstrating that health and safety is as important as production and by listening to, and taking on board the views of the workforce, so trust is built and hence a positive health and safety culture can flourish.

### **Pitfalls and Problems of Cultural Change**

#### **Attempts to Change Culture Too Rapidly**

One of the most common mistakes is to assume that the implementation of a new culture is fast and easy. It can take years to change a culture. Some organisations treat culture change like the implementation of a new system: now that we have defined what needs to be done, let's execute... And they are disappointed if the culture is not yet

fully developed after three months. As everybody who has ever wanted to quit smoking or learned how to speak in public knows: behavioural change is not that straightforward. It takes time and needs continuous attention.

Attempts to change too rapidly might include adopting every possible safety improvement at the very beginning of the process, overloading the workers and managers with changes to introduce and sustain. This can be too demanding, and the change will lose momentum when targets appear to be missed. From the workers' and managers' perspective, it could be perceived as just another short-lived change that will not survive in the long-term or will soon be forgotten by Senior Management.

### **Adopting Too Broad an Approach**

It is easier to build up to a large-scale change than to back off from an overly broad initial approach. It is far better to learn from limited success and then to move on to larger changes.

Too broad approach to change can unrealistically raise expectations, whilst too narrow approach may not raise enough energy to carry the process very far.

### **Absence of Trust in Communications**

Failure to display a long-term commitment to the change will lead to an absence of trust in communications. In other words, workers will become sceptical when management announce changes. If management change their approach or priorities whenever a serious problem occurs, this might betray a lack of commitment.

Communications must be two-way. When workers communicate back to managers, they must be seen to consider what they have been told and act on the information. Management must also constantly feedback to workers the progress of the change, and whether the change is having the desired effect.

Management must keep its promises. If they promise to deliver a change by a particular date, or if they promise an improvement for the workers, they must deliver on this. Breaking promises or commitments will lead to a loss of credibility. Most future statements will then be treated with cynicism and management will need to work hard to win workers' trust.

### **Resistance to Change**

Some people, particularly older people, are more resistant to change than others. Organisations must expect change and know how to deal with it proactively. It is far better to anticipate objections and to attempt to solve these in the initial plan.

Barriers to change can be broken down by helping individuals see that the new ways of doing things will be beneficial to them personally. It requires giving full information, explaining the benefits, including them in making the changes (thereby creating a sense of ownership), and taking a gradual approach.

Resistance to change is quite natural. Most people take some time to accept and embrace change. It is also for this reason that a step-by-step approach is highly desired. Give time to people to adjust.

### **The UK Health and Safety Executive (HSE) "Safety culture maturity model (SCMM)"**

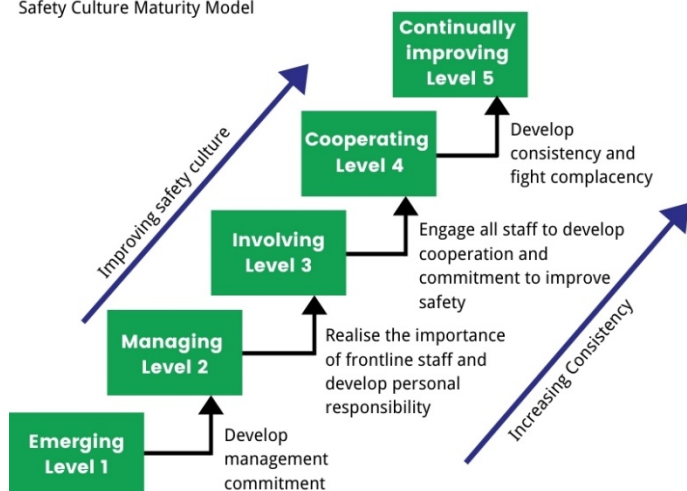
Developed initially with the UK offshore oil and gas industry in mind, who were trying to achieve an overall step change improvement in safety performance, it was perceived that behavioural and cultural issues needed to be addressed in order to achieve this improvement.

The safety culture maturity of an organisation consists of ten elements, which are listed below. An organisation's level of maturity is determined on the basis of their maturity with respect to each of these elements. It is likely that an organisation will be at different levels on the ten components of the SCMM.

- Management commitment and visibility
- Communication
- Productivity versus safety
- Learning organisation
- Safety resources
- Participation
- Shared perceptions about safety
- Trust
- Industrial relations and job satisfaction
- Training

The safety culture maturity model comprises five levels of safety culture maturity.

Safety Culture Maturity Model



Organisations using the model are recommended to progress sequentially through the five levels, by building on the strengths and removing the weaknesses of the previous level. The levels are summarised as follows:

**Level One: Emerging.** Safety is defined in terms of technical and procedural solutions and compliance with rules and regulations. Safety is not seen as a key business risk and the safety department, not line management, is perceived to have primary responsibility for safety. Many accidents are seen as unavoidable and as part of the job.

**Level Two: Managing.** The organisation's accident rate is average for its industrial sector, although tending to have more serious accidents than average. Safety is recognised as a risk to the business risk and some management time and effort is put into accident prevention. Safety is considered in terms of adherence to rules and procedures and engineering controls. Accidents are seen as being preventable, but managers consider that the majority of accidents are solely caused by the unsafe behaviour of front-line staff. Safety performance is measured in terms of lagging indicators such as injury or lost time injury (LTI) rates and safety incentives are based on reduced LTI rates. Management is reactive with regards to their involvement in health and safety (for example, blame and discipline is used when accident rates increase).

**Level Three: Involving.** Accident rates are relatively low, but they have reached a plateau. The organisation is convinced that frontline employee involvement in health and safety is required if further improvements are going to be made. Managers acknowledge that accidents can have multiple causes, with the root causes originating from management decisions. Front-line employees are willing to work with management to improve health and safety and the majority of staff accept personal responsibility for their own health and safety. Safety performance is actively monitored (for example audits, inspections).

**Level Four: Cooperating.** The majority of staff in the organisation recognise the importance of health and safety from both a moral and economic point of view. Managers acknowledge that accidents can have multiple causes, with the root causes likely to arise as a result of management decisions. Frontline staff accept personal responsibility for their own and others health and safety. Staff also recognise the importance of all employees feeling valued and treated fairly. The organisation is pro-active in its efforts to prevent accidents. Safety performance is actively monitored using all data available. The organisation also monitors non-work accidents. A healthy lifestyle is also promoted.

**Level Five: Continuous improvement.** The prevention of all injuries or harm to employees (both at work and at home) is a core company value. The organisation has gone many years without a recordable accident or high potential incident. However, but there is no complacency in the organisation – they are of the view that next accident is just around the corner. The organisation uses a range of indicators to monitor health and safety performance, but it is not performance-driven, as it has confidence in its health and safety management processes. The organisation is constantly striving to be better and find better ways of reducing risk and improving hazard control. All employees share the belief that health and safety is a critical aspect of their job and accept that the prevention of non-work injuries is important.

### **The concepts of blame, no-blame and just culture (Dekker)**

A “blame culture” is one in which people are reluctant to speak out or accept responsibility at work because they fear criticism, disciplinary action, or worse. Possible signs of a “blame culture” include gossiping, ambiguity about who is responsible for what, casting blame on others, and attempts to hide mistakes.

Leadership defines culture. If leaders are quick to blame, then others in the team (such as supervisors, managers) may be quick to follow suit. This may often involve using an opportunity to cover up their own mistakes by pointing their fingers at others (for example, blaming a frontline worker for an accident when a supervisor has failed to provide the worker with adequate training). This ultimately creates an atmosphere of fear and distrust which will lead to a toxic work environment.

A ‘no blame’ culture suggests just that, and if this concept is declared by an organisation, it should be no surprise that, if disciplinary action follows after a “no blame” investigation is completed, the confusion, scepticism and mistrust that may arise.

According to well-known safety author Sidney Dekker, when we refer to accountability and responsibility, we usually mean **accountability** (per his book “Just Culture – Balancing Safety and Accountability”, 2012).

It is generally agreed that it is reasonable to expect workers to conduct themselves in a way which does not carelessly or deliberately put themselves or others at risk, particularly when the organisation has provided policies, procedures, and training on the subject.

Organisations that buy into this support a culture of accountability and responsibility. In other words, a “just culture”.

It is suggested that a “just culture” can be identified by organisations who implement the following principles:

- No matter what happens we will always start with the presumption that our people have acted in good faith and treat all individuals with respect.
- When incidents occur, we will consider all the contributory factors, not just the immediate actions of those closest to the event.
- We will use every incident as an opportunity to improve our systems.
- We will strive to ensure all our procedures and instructions are clear and practical.
- We will train everyone to do their job well and provide more training if requested or found necessary.
- We will continually strive to build an atmosphere of trust in which people feel comfortable and are encouraged to provide important safety-related information.
- We expect everyone to behave appropriately, per their training, for the circumstances.
- We will not ask you to trust us. We will demonstrate this through the equity of our decisions.

## **Behavioural change programmes**

### **Why behavioural change programmes are used**

Research has suggested that up to 80% of work-related accidents are caused by employees' behaviour. Behavioural safety is the name given to several types of programmes that aim to improve an organisation's safety culture by changing the behaviour of workers.

### **Advantages and disadvantages of behavioural change programmes**

#### **Advantages include:**

- Workers are directly engaged in health and safety.
- Records of data collected (safe and unsafe behaviours) can be fed into performance review.
- Can empower workers to act promptly in response to “at-risk” behaviours.

#### **Disadvantages include:**

- Can result in “blame workers” culture if not implemented properly.
- Significant amounts of meaningful data may be required for behaviour analysis.
- May be time-consuming and expensive to implement.

### **The principles of behavioural change programmes**

Health and safety in the workplace is influenced by several factors, from the organisational environment through managers' attitude and commitment to the nature of the job or task and the personal attributes of the worker. Health and safety-related behaviour in the workplace can be changed by addressing these major influences.

The Institute of Occupational Safety and Health (IOSH) in their guidance document *Looking for Higher Standards (Behavioural Safety – Improving Performance)* states "One way to improve health and safety performance is to introduce a *behavioural safety process* that identifies and reinforces safe behaviour and reduces unsafe behaviour. Behavioural safety processes aren't a 'quick fix' and it's important not to overlook fundamental elements, such as

basic welfare facilities and a safe workplace and equipment. Once these basics are in place, you should then concentrate on policies and systems, assessing and improving management and operational factors, training, design, and so on."

Behavioural change programmes are based on observation. Trained observers go into the workplace and observe workers carrying out tasks. They then engage the worker(s) in discussion to get the worker to recognise any of his own safe and unsafe behaviour during the execution of the task, and to come up with recommendations for improvement. The programme will usually involve follow up, feedback, and some form of measurement of performance. During the discussion, there is opportunity for praise, recognition, and constructive advice.

However, the UK HSE points out that "*addressing behaviours must not be seen as an alternative to ensuring that adequate engineering design and effective safety management systems are in place*" and goes on to say that "*cultural or behavioural interventions will only be successful if engineering, technical, and systems aspects are in place and adequately managed*".

Therefore, before sites (particularly those that manage major hazards) embark on a behavioural safety programme, they need to ensure that they have satisfied the following conditions:

- All hazards have been identified.
- Human performance issues have been identified and managed (particularly in relation to safety critical roles and activities).
- The "hierarchy of control" has been applied to prevent the realisation of identified hazards or minimise their consequences should they occur.
- Both senior and line-management are committed to improving health and safety performance, and already take ownership of this.
- There is no blame culture in the organisation. If something goes wrong, the organisation asks "Why?" and not "Who?"

The Health and Safety Authority in Ireland (HSA) in their publication, Behaviour Based Safety Guide, state that "A behaviour-based health and safety approach (BBS) promotes interventions that are people-focused and often incorporate one-to-one or group observations of workers performing routine work tasks, setting goals carefully, giving timely feedback on safety-related behaviour, coaching, and mentoring. The initiatives have a proactive focus, encouraging individuals and their work groups to consider the potential for incident involvement, (accidents) and to assess their own behaviour as safe or unsafe always, no matter what".

The HSA state the BBS approach:

- "Is based on solid principles about engaging, motivating, assisting, reinforcing, and sustaining safe behaviours.
- Takes a systematic approach, examining the motivation underlying behaviours, to increase safe behaviour.
- Is an ongoing effort. Not 'one-off' initiative, but a new way of working that the leader must continually promote for sustainable, positive results.
- Takes time to achieve. However, results can be observed immediately due to the nature of measurement involved.
- Emphasises increasing safe behaviours rather than focusing on length of time without injury. BBS programmes do not depend solely on 'lagging indicators' (after the fact), and instead shift the focus to 'leading indicators' (preventative).





- Is not a substitute for an already existing comprehensive health and safety programme. It is a supplementary tool that will enhance the effect of already existing practices".

The Workplace Safety & Health Council (Singapore), in their publication: WSH Guide to Behavioural Observation & Intervention states that "A BBS initiative operates with the underlying principle of the duty of care. It works towards making safety a habit for all workers, encouraging them to feel a sense of ownership towards the safety of everyone in the company.

Ultimately, BBS enables a company to move towards zero injuries as a safety goal.

- Duty of care
  - It is the responsibility of each employee to look out for and care for one another, regardless of position or seniority. This helps ensure that every worker can go home safely at the end of each day.
- Recognition of safe behaviour and concern for at-risk behaviours
  - Every employee is to actively look out for their colleagues. If they observe safe behaviours, they should offer positive reinforcement and encouragement (e.g. verbal praise). However, if they observe at-risk work behaviour, they should not hesitate to intervene immediately on-site. They should express concern for their colleague's safety and offer safer alternatives on how to work.
- "No name, no blame"
  - The aim of BBS is to reinforce safe behaviours and identify at-risk work behaviours. It is not about finding faults or apportioning blame, hence the "no name, no blame" approach. Any written documentation concerning incident observations and associated findings should not contain the identity of the person being observed. This allows open and uninhibited communication and ensures that the focus of the programme remains on improving workplace health and safety.
- Peer coaching
  - The behavioural approach to safety relies largely on on-site observation and feedback. While this can initially be led by managers and supervisors on the ground, the true benefit of BBS can be realised only when employees take ownership of the initiative and realise that they can actively participate in safety through peer coaching. Peer coaching involves timely and constructive feedback between any two (or more) employees when they observe safe or unsafe workplace behaviour. It is through this enhanced communication that safe behaviours can be recognised, and at-risk behaviours addressed in a timely manner, before they lead to undesirable outcomes.
- Proactive approach
  - Instead of taking action only after an accident has occurred, this approach emphasises proactively identifying at-risk behaviours. This means that hazardous situations can be avoided before they occur, leading to a reduction in near-miss incidents and workplace injuries.
- Safety as a value
  - Safety is not just a first priority, as priorities can change according to external factors. It should be a corporate value internalised and actively practiced by each employee. With safety as a core value, employees share the belief that all injuries are preventable, and that safety should be embraced as a way of life.
- Make safety a habit
  - Habits are essentially routines of daily behaviour that are repeated regularly and tend to occur subconsciously. Safe habits (e.g. wearing a seat belt before driving a vehicle) can be developed over time, especially with frequent reminders (e.g. through signage and/or conversations with colleagues)

and a workplace culture that stresses the importance of developing safe work habits. Starting with documented Safe Systems of Work, the necessary training, and sufficient practice, a person's proficiency in carrying out a particular task can be developed to the point where their competence operates at an unconscious level. This is when safety becomes a habit, leading to the subconscious repetition of safe behaviours at work.

Workforce ownership, teamwork, and participation

All members of the organisation should feel a sense of ownership regarding safety, from the Chief Executive Officer to the last employee. Ownership of safety should be pervasive and not solely confined to the Health and Safety Team. Every employee needs to understand their role in ensuring safety and how each person can participate and contribute both individually and as a team".

### **The Organisational Conditions Needed for Success in Behavioural Change Programmes**

There are several key conditions that are required if organisations are to make a success of any behavioural change programme that they introduce. They include:

**Ownership:** The programme must be understood and accepted by the workforce. The UK HSE suggest that this is best achieved by organisations developing a programme to for their own particular needs (and involving workers in the development).

**Commitment:** As with any aspect of health and safety, the programme must have the commitment of senior management. In fact, better programmes will *involve* senior management.

**Good communication:** Vital is the communication of the programme, its purpose, its goals and, when running, feedback of the ongoing progress to all the workforce.

**Trust:** The approach must be seen as "fair and just", not blame. People understand the boundary between behaviours considered acceptable and unacceptable. Unacceptable behaviours are dealt with in a consistent, just, and fair manner.

**Leadership:** Managers and supervisors act as role models. They "do what they say." They address unsafe situations. They encourage, recognise, and praise good behaviour.

Organisations should not underestimate the effort and planning required in delivering a behavioural change programme, nor should they be over-optimistic about the results. It is estimated that it can take up to 5 years to effectively change behaviour, and up to a generation to change a safety culture. In addition, care should be taken not to lose focus on other aspects of health and safety.

Finally, organisations should not consider behavioural change programmes unless:

- They are confident that they have a strong management system and a safe workplace.
- Senior management will be committed to its success.

## 2.5: Safety Management

### Traditional safety (sometimes called ‘Safety I’) and Proactive safety management (sometimes called “Safety II” or “Safety Differently”)

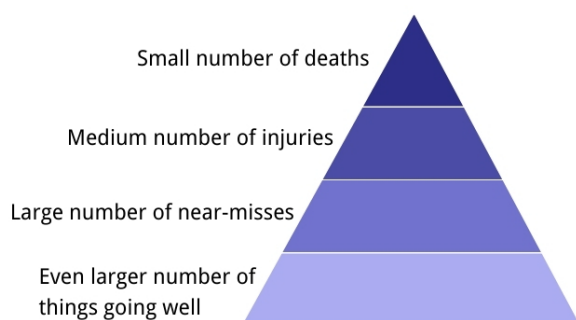
A 2013 white paper (written by Professors Hollnagel, Wears and Braithwaite) perhaps redefined the way in which safety is seen, with the introduction of the “Safety I” and “Safety II” concepts.

Safety I is defined as “as few things as possible go wrong”. It takes accidents as the focal point and tries to prevent them by determining immediate and underlying causes and eliminating or controlling them. A fundamental flaw is that this approach ignores the many opportunities for learning from what goes right most of the time, and how people respond to abnormal conditions to prevent escalation.

Crucially, the Safety-I view does not stop to consider why human performance practically always goes right. Things do not go right because people behave as they are supposed to, but because people can and do adjust what they do to match the conditions of work.

Hollnagel et al argue that things go wrong, or right, for the same basic reasons.

If we consider putting another layer at the bottom of the accident triangle labelled "everything goes well" (below) we can see the numerous opportunities to learn that this gives us.



Safety I is based on the idea that following procedures correctly will always lead to the right result, whereas Safety II recognises that complex systems can't always be broken down into simple "do this, then that" steps.

People must adjust what they do every day -- variability is essential to doing the job. The message behind Safety II is that the variability that completed the job safely on one day is the same variability blamed for the accident on the next. Rather than attempting to create safety management procedures under which everyone works "to the system", Safety II proposes resilient systems are built that can adjust to cope with unpredictable conditions.

Safety II does not mean the end of Safety I. organisations still have to do many of the things that were applied in Safety I. Rules and procedures are needed (ensuring that users have an input to their development). However, with ever more complex systems, some new thinking is required to make sure that rules and procedures do not reduce people's freedom to be flexible and adaptive.

One analogy of Safety I and II put forward (Green) is this. He describes an overweight, unfit person who wants to undertake the Iron Man triathlon. First, they must lose weight, then they must get fit. Traditional safety (Safety I) is how organisations lose weight and Safety II is how they get fitter.

## Overview of Safety I and Safety II

	Safety - I	Safety - II
Definition of safety	That as few things as possible go wrong	That as many things as possible go right
Safety management principle	Reactive, respond when something happens or is categorised as an unacceptable risk	Proactive, continuously trying to anticipate developments and events
View of the human factor in safety management	Humans are predominantly seen as a liability or hazard. They are a problem to be fixed	Humans are seen as a resource necessary for system flexibility and resilience. They provide flexible solutions to many potential problems
Accident investigation	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify the causes	Things basically happen in the same way, regardless of outcome. The purpose of an investigation is to understand how things usually go right as a basis for explaining how things occasionally go wrong
Risk assessment	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify causes and contributory factors	To understand the conditions where performance variability can become difficult or impossible to monitor and control

### Summary of the differences between Safety I and Safety II.

#### Safety I:

- Focuses on the absence of danger, where as few as possible things go wrong (such as absence of accidents, errors, or violation).
- Tends to be reactive. For example, when something goes wrong there is an investigation.
- The main focus is on compliance. For example, compliance with the Law or a procedure.
- Key performance indicators (KPI's) sometimes based on negative outcomes, such as number of injuries, number of spillages, number of dangerous occurrences.
- People often seen as part of the problem/cause in the event of an incident.

#### Safety II:

- An extension of Safety I, but with a focus on the positives rather than the negatives.
- Removal of unnecessary bureaucracy, such as “procedures for everything”.
- People seen as part of the solution.
- Builds trust in the workforce.
- Events become more foreseeable.
- Learn to improve by analysing normal work activities.

#### Safety I:

- Tends to focus on “after the event” (reactive).
- Driven by compliance and bureaucracy.
- Authoritarian (enforcement by “strict obedience” - to procedures, for example).

#### Safety II:

- Predicted situations may not happen – waste of time, energy, money.
- Predictions might be wrong.
- Organisations’ may be averse to trying Safety II.

### **The effects of proactive safety management on health and safety culture**

Proactive safety management can have a significant effect on safety culture. Workers will feel valued by being involved in improvements – in other words, being part of the solution and not the problem. By involving workers in health and safety solutions, and by moving any unnecessary bureaucracy will demonstrate management commitment to health and safety. This can only lead to respect between management and workers, and hence an improved safety culture in the organisation.

## 2.6: Risk Perception

### Human Sensory Receptors, their Reaction to Stimuli, and Basic Screening Techniques

#### The "Five" Senses

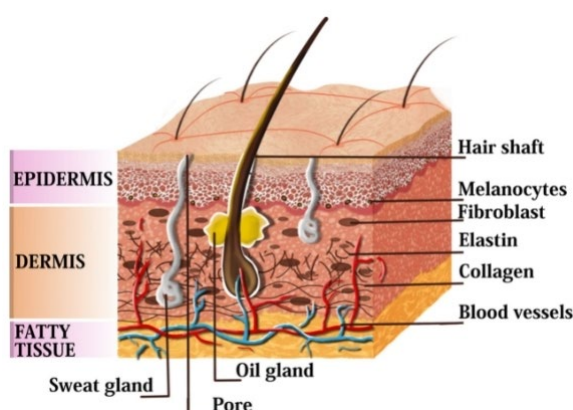
For thousands of years, it was believed that there were only five senses: sight, smell, touch, taste, and hearing. However, this has been updated to include the kinaesthetic sense (sense of motion) and the sense of balance.

A sensory receptor is a sensory nerve in an organ that responds to stimulus.

"Human sensory reception", is a means by which humans react to changes in external and internal environments" (as defined by the Encyclopaedia Britannica)

The main sensory receptors include:

- Chemoreceptors: stimulated by the presence of chemicals. Externally via smell and taste, and internally by the blood.
- Thermoreceptors: stimulated by temperature within and outside the body.
- Nociceptors: recognise pain associated with external mechanical, thermal, and chemical stimulation.
- Mechanoreceptors: respond to a wide array of external stimuli such as touch, pressure, stretching, itching, and vibration.
- Photoreceptors: are stimulated by the presence of light.



The sensory receptors therefore provide the human body with an excellent early warning system by transmitting an early warning of danger thanks to our key senses: touch, sight, smell, hearing, and taste.

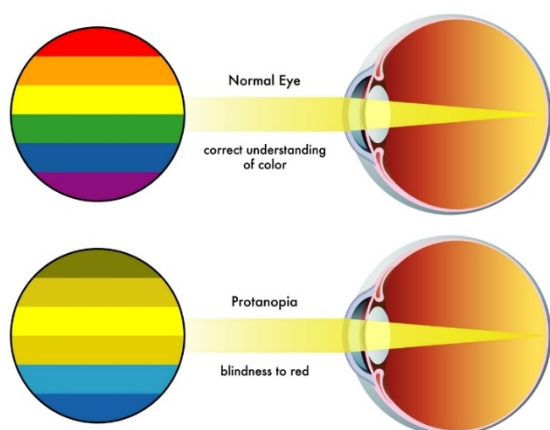
#### Sensory Defects and Basic Screening Techniques

The senses provide workers with a means of detecting danger at an early stage. That early warning opportunity is lost if the senses are not functioning correctly. Here are examples of defects and possible screening techniques

##### Sight

A common visual defect is colour vision deficiency, where there is a lack of ability to differentiate between different colours, in particular red and green. 8% of men have some level of colour blindness or colour vision deficiency. Examples where this may be a problem include:

- Drivers who may have problems with traffic lights at night, which can be impossible to distinguish from streetlights in certain conditions.
- An electrician who cannot differentiate between the different coloured wires.
- People who cannot see coloured safety signs or instructions very clearly.



Colour blindness screening includes the "Ishihara" test, which involves using plates made up of different coloured dots which depict numbers. Where an individual has difficulty identifying a number, it could indicate colour blindness.

Another type of visual defect is visual impairment or loss. This is the decreased ability to see, which cannot be corrected by glasses. The term 'blindness' is used for complete or near complete vision loss.

## Smell

The nose enables us to identify a wide range of odours. For example, in the workplace it can detect gases, again giving an early warning of a potential gas leak. Some gases, however, can damage the nose (such as acid gases) and some can deaden the smell buds temporarily. Hydrogen sulphide, for example, deadens the sense of smell at very low concentrations, making it particularly hazardous.

Odour kits are available which can indicate gross olfactory dysfunction.

## Hearing

The ears pick up sounds, including speech and noisy machinery. They can also allow us to determine sound direction. In addition to infections, the hearing can be damaged by high levels of noise (noise-induced deafness has long been a big health issue in manufacturing workplaces). Hearing deficiencies prevent workers from hearing critical warnings, such as emergency alarms or sirens.

The basic screening test is audiometry (hearing test). This can differentiate noise-related hearing loss from age-related loss.

## Skin

The skin, the largest body organ, enables to sense touch, pain, heat, or cold. It is very robust, but can be damaged by, amongst other things chemicals, hot or cold material, abrasive, or sharp materials. Damage to sensory nerves can cause pain or numbness.



## The Process of Perception of Danger Perceptual Set and Perceptual Distortion

### Perception of Danger

The process used to make sense of all encountered stimuli, is perception. It is based on our interpretation of the sensations and sensory impression from the stimuli we receive.

Perception may therefore be defined as *"the way in which people interpret information that they receive from their senses"*.

Our ability to receive and interpret information in the workplace (such as smelling and recognising hydrogen sulphide) is an important factor in detecting danger and minimising risk.

Perception is a key component of human behaviour. It is the mechanism with which an individual evaluates inputs from the external environment which, in turn, determines his behavioural response. In conjunction with personality, attitudes, and previous experiences, perceptions comprise an individual's unique appraisal of the environment. These perceptions are critical precursors that precede behaviour and are vital in protecting workers from danger in the workplace.

For example, when an individual faces danger they either face it (fight) or avoid it (flight). Some people perceive danger in every situation, while others rarely see it. Because of these differences, some people have a greater inclination to take risks, whilst others have a greater inclination to avoid risks.

A person's inclination to take risks is determined by their perception of the situation, their past experiences, and their personality.

### Perceptual Set

Everyone, in each situation, has their own expectation about the information that will be perceived. This expectation, often referred to as *"perceptual set"*, can distort perception by causing people to overlook aspects of the situation that they do not expect to be there, or to *"see"* information that is not present. Such reliance on expectation rather than presented information occurs:

- In habitual tasks
- Under time pressure
- Under the influence of drugs or alcohol
- Where the person is fatigued or distracted

For example, a mechanical engineer tries to tighten up a mechanical seal on a pump which is leaking. He knows that this seal must be turned anti-clockwise to tighten it. But most other seals in his workplace must be turned clockwise. This seal is different. He momentarily forgets this, and turns the seal clockwise, causing the leak to get worse. He then realises his mistake, tightens the seal correctly, and then must clean up the leak.

The brain is not able to pay attention to every detail around us every moment, so it focusses in on a particular task at hand to allow us to give it our full attention, whilst blocking out everything else.

When presented with stimuli our brains go through a 3-step process of selection, organisation, and interpretation:

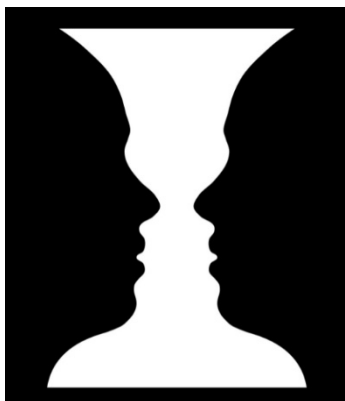
1. We select what to focus on
2. Organise the elements in our brains

### 3. Interpret what we see

However different people can view the same thing and interpret it differently.

A good example of this is the Rubin's Vase illusion (see below). When people view this image and organise the elements - some interpret the image as two faces if organising the dark sections as background or as a vase if focussing on the light sections as background.

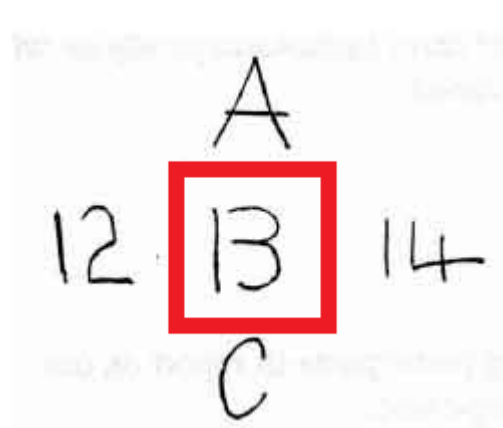
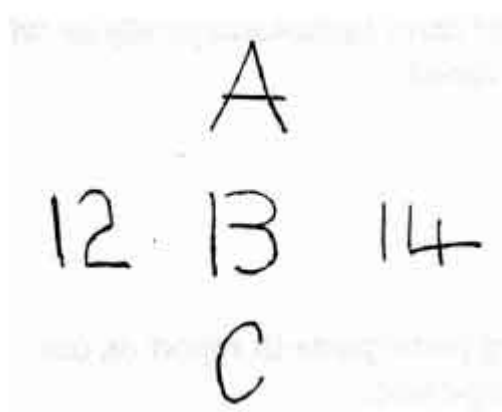
The perception process happens unconsciously in less than a second.



**Rubin's vase**

Here is another example of how expectation can influence perceptual set. Here is an ambiguous figure '13' set in the context of letters or numbers.

#### **The number 13. Or is it a B?**



In the diagram above the centre image (highlighted red) will either be read as a B if the viewer reads down the vertical or as 13 if read from the horizontal. This is because the brain expects to see another letter in the vertical row of letters and expects to see another number in the horizontal row of numbers.

Here is a picture of a rat:



### A rat

What can you see in this drawing?



### “Rat-man”.

Do you see a rat? Or a man with glasses?

A study in 1961 using the ‘rat man’ ambiguous figure also demonstrated the importance of expectation in encouraging perceptions. Prior to being exposed to the ambiguous rat man picture, participants viewed a series of animal or neutral pictures. The findings showed that the ambiguous picture was more likely interpreted as a rat by participants exposed to the animal pictures.

Expectation can also influence other senses. For example, if a person favours expensive brands of food or drink, they might believe a particular food or drink tastes better than it does if they are told it is an expensive brand.

Another example is everyone’s sensitivity to hearing their own name in a crowded room.

The relevance this has for health and safety is that people will often act according to their expectations. For example, they might open an interlocked guard and, expecting the machine to stop abruptly, put their hand inside without waiting. If the interlock doesn’t turn off the power like it normally does, they would be badly injured.

## Perceptual Distortions

*"Perceptual distortions* are incorrect understandings or abnormal interpretations of a perceptual experience. A perceptual distortion occurs when a person's response to stimuli varies from how it is commonly perceived.

An example of perceptual distortion is found in people suffering from an eating disorder. People afflicted with anorexia nervosa holds a distorted self-image. They see their bodies as overweight and unsightly, whereas other people see the sufferer as malnourished and underweight.

Perceptual distortions can result from cognitive biases, or patterns of thought, and deviations in judgement in particular situations. Common examples are the 'observer expectancy' effect, known also as the selective perception bias, which skews interpretation of results to be in line with a theory one already believes".

This is one of the reasons why many people seem incapable of changing their mind on something, even when presented with evidence they are wrong. They can only see the things which confirm their belief.

A cognitive bias is a pattern of deviation in judgement that occurs in particular situations and can lead to perceptual distortion, inaccurate judgement, illogical interpretation, or what is broadly called 'irrationality'.

According to boundless.com "The ways in which we distort our perception are particularly relevant for managers because they make many decisions, and deal with many people making assessments and judgements. Managers must be aware of their own logical and perceptive fallacies and the biases of others. A few useful perceptual distortions managers should be aware of include:

- Confirmation bias. Simply put, humans have a strong tendency to manipulate new information and facts until they match their own preconceived ideas. This inappropriate confirmation allows for poor decision-making that ignores the true implications of new data.
- Self-serving bias. Another common bias is the tendency to take credit for success while blaming others for failure. Managers must monitor this in workers and realise when they are guilty themselves. Being objective about success and failure enables personal growth and ensures proper accountability.
- Belief bias. Individuals often decide before they have all the facts. In this situation, they believe that their confidence in their decision is founded on a rational and logical assessment of the facts when it is not.
- Framing. It is quite easy to be right about everything if you carefully select the context and perspective on a given issue. Framing enables people to ignore relevant facts by narrowing down what is considered applicable to a given decision.
- Causality. Humans are pattern-matching organisms. People analyse past events to predict future outcomes. Sometimes their analysis is accurate, but sometimes it is not. It is easy to see the cause-effect relationship in completely random situations. A correlation between two trends does not indicate a cause-and-effect relationship".

Human beings have developed stereotypes (fixed images or views) to sometimes pre-empt stimuli and to make the perceptual process easier and faster. Stereotypes expect something to happen in a certain way. For example, if we turn a valve clockwise the flow will stop; pulling a lever down will turn something off. However, stereotypes change from country to country. In the UK, for example, a light is switched off by turning it down, in the USA the switch is pushed up. It can be seen, therefore, that mistakes can easily be made if the stereotype differs from reality.

Standardisation can reduce possible errors (for example, in 1996 Europe introduced a standard for health and safety signs, so that the visual sign and its meaning were the same wherever workers moved throughout Europe).

## Errors in Perception caused by Physical Stressors

Typical workplace physical stressors include:

- Temperature and humidity (high and low)
- Noise and vibration
- Lighting levels (high or low)
- Working in adverse weather
- Shift work and fatigue
- Influence of drugs and alcohol
- Interference from PPE

These common stressors can affect an individual's ability to properly interpret information around him (such as hearing an alarm, smelling a gas leak, seeing a trip hazard) thereby increasing the risk.

In the case of PPE, some PPE can affect people's ability to see, hear, smell, or feel. For example, excessive hearing protection can prevent a worker from hearing an alarm. Safety glasses or goggles can mist up, which makes it difficult to see. They can also get scratched, and the scratch can be distracting.

## Perception and the Assessment of Risk; limitations on Human Performance and Filtering and Selectivity as Factors for Perception

### Perception and the Assessment of Risk

Scientists and social scientists began to research how people formulate and respond to the notion of risk in the 1960's. This research started due to the public concerns of the use of nuclear technology. Despite scientific evidence affirming that these technologies were safe, there was unexpected panic from the public who feared radioactive disasters and long-term environmental damage.

Paul Slovic, a psychologist, championed the psychological method to risk perception theory. He studied the biases created by people when interpreting the level of risk in their environment.

In his article published in Science in 1987 Slovic stated that in the public there are inconsistent evaluations of risks due to social and cultural factors.

Slovic highlighted the important ways in which experts and lay people interpret risks. The experts evaluate risks in terms of a quantifiable assessment of injury and death. Whereas generally people's perception of risk is more complex, including psychological and cognitive processes.

As important as it is to recognise peoples' responses to risks it is more important to identify the attributes that lead people to estimate risk as they do. In his 1987 article Slovic summarised that:

*"People tend to be intolerant of risks that they perceive as being uncontrollable, having catastrophic potential, having fatal consequences, or bearing an inequitable distribution of risks and benefits. Nuclear weapons and nuclear power score high on these characteristics. Also, unbearable in the public view are risks that are unknown, new, and delayed in their manifestation of harm. These factors tend to be characteristic of chemical technologies in public opinion. The higher a hazard scores on these factors, the higher its perceived risk and the more people want to see the risk reduced, leading to calls for stricter regulation."* [Slovic argued that]"risk management is a two-way street:

*just as the public should take experts' assessments of risk into account, so should experts respect the various factors, from cultural to emotional, that result in the public's perception of risk".*

Now, imagine you're going on holiday with children somewhere hot and exotic, where the kids will spend half their time in the sea. Apart from drowning, would you be most concerned about sharks or coconuts? Unless you've heard this before, you'll probably say the sharks. But in truth, deaths because of falling coconuts are about 10 times as common as deaths from shark attacks - around 200 and 20 fatalities worldwide each year, respectively.

This erroneous risk perception is probably driven in part by a primeval fear of being eaten alive by another animal. Understanding this, and other common errors in risk perception, can help us understand why we make so many mistakes in safety management decision-making, and how tools as simple as benchmarking can help employers mitigate the effects of flawed reasoning and a lack of objectivity. Many people who have worked in an industry for many years will tend to underestimate the risks. When involving them in a risk assessment for the first time, they might tend to rate all risks as low, and believe that existing control measures are sufficient.



### ***Unstable stacks of materials***

A long-serving manager may think this is acceptable. A Health and Safety professional might think it is a death trap.

### **Perception and Limitations of Human Performance**

*"Every man takes the limits of his own field of vision for the limits of the world."*

—Arthur Schopenhauer, *Studies in Pessimism*.

Humans have limits as to what they can do and perceive. Below are some perceptual limits directly impacting on how humans understand the world taken from [io9.gizmodo.com](http://io9.gizmodo.com).

### **Field of View**

A pair of healthy human eyes has a total field of view of approximately 200 degrees horizontally, about 120 degrees of which are shared by both eyes, giving rise to what's known as 'binocular vision'. We cannot see what is happening outside of our field of view.

## **The Blind Spot**

The human eye is lined with photoreceptor cells that it uses to perceive light. Visual information received by these photoreceptor cells is relayed to the brain via the optic nerve. The only problem is that the optic nerve passes through part of photoreceptors lining the inside of the eye, creating a small, receptor-less patch where it's impossible to detect light.

Normally this isn't a problem. We've got two eyes, and our brains are incredibly good at using the visual information gathered from each eye to fill in the gaps left by the other's blind spot. But things get difficult when you must rely on just one eye.

## **The "Visible" Spectrum**

Probably the most well-known of human sensory limitations, the typical human eye is only capable of perceiving light at wavelengths between 390 and 750 nanometres. We call it the visible spectrum, because everything happening outside of this spectrum is invisible to us.

## **Hearing Range**

Among young, healthy humans, the range of frequencies that can be picked up by the human ear is usually cited as 20 to 20,000 Hz. However, the upper limit on that range tends to decrease steadily with age.

## **Sensory Overload**

Sensory overload can result from the overstimulation of any of the senses.

- Hearing: Loud noise, or sound from multiple sources, such as several people talking at once.
- Sight: Crowded or cluttered spaces, bright lights, strobing lights, or environments with lots of movement such as crowds or frequent scene changes on television.
- Smell and taste: Strong aromas or spicy foods.
- Touch: Tactile sensations such as being touched by another person or the feel of cloth on skin.
- Vestibular: such as dizziness or motion sickness.

Organisations must ensure that workers are not put in danger due to excessive sensory input. For example, too many alarms or flashing lights, which can cause them to miss real dangers, either due to not noticing them or ignoring them. During the inquiry into the Longford disaster in Australia, Esso discovered that during a previous incident 12 alarms every minute were received during a 12-hour shift. This led to the alarms being ignored.

## **Absolute Threshold of Hearing**

Your absolute threshold of hearing is the quietest sound your ears can pick up when there are no other sounds around to mask its perception. This threshold varies from person to person, changes with age, and is largely dependent on the frequency of the noise being perceived. It's also quieter than you might think.

## **Filtering and Selectivity as Factors for Perception**

Selective perception is *"the mental recasting of a message so that is in line with an individual's beliefs."* Or *"a person who only perceives what he/she desires to and sets aside or ignores other perceptions or viewpoints."*

Allport and Postman's classic 1945 study is a classic example of this. The two psychologists show a picture of a fight on a train. The combatants were a white male grasping a razor and an unarmed African American male.



*There are two types of selective perception: perceptual vigilance and perceptual defence. The low level of selective perception, perceptual vigilance refers to the process in which the individual notices and recognises the stimuli that may be significant to him at some degree. On the other hand, perceptual defence occurs in an attempt of a person to create a barrier between him and the stimuli so that he could protect himself from having awareness of it. Often, these stimuli are perceived to be threatening or unpleasant, such as obscene words and violent actions. This is the high level of selective perception wherein violent actions are not accurately seen or foul words are not precisely heard. Researchers say that people with high level perceptual defence have a strong "perceptual wall" which serves as the filtering mechanism, making them unable to perceive unwanted stimuli".*

## 2.7: Human failures and factors. Improving human reliability

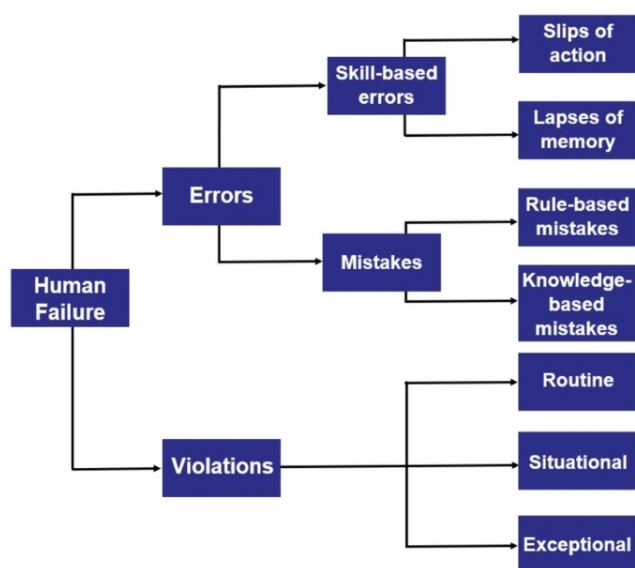
### Human failure

**The classification of human failure (with reference to UK HSE guidance HSG48 – Reducing Error and Influencing Behaviour)**

It is no longer acceptable to simply attribute accidents to human error that is beyond the control of managers. Whilst Managers may not be directly responsible for the error that may have caused an incident, they are still accountable and therefore have a duty to ensure that the reasons behind an accident or incident are fully investigated to ensure that it is not repeated. To do this, organisations need to look at how human factors can be recognised as an important element to assess and manage effectively in order to control risks.

Examples of accidents where 'human error' has given rise to a major accident with loss of life and injuries. These include Piper Alpha, Bhopal, Three Mile Island, and Chernobyl. In many of the major accidents where human failure has been cited, it was one of several causes including technical, communication or management failures that resulted in the final outcome. A lot of everyday minor accidents and near misses also involves human failures.

There are different types of human failures: **errors** and **violations** (see figure below).



- A **human error** - an unintentional action or decision that deviated from an accepted standard (or rule) and which led to an adverse outcome.
- A **violation** - a deliberate decision to deviate from a set rule, standard or procedure.

### Errors

Errors can be categorised as **slips**, **lapses**, and **mistakes**.

**Slips and lapses** occur in tasks that do not require much conscious attention e.g. locking a door. These are "skill-based tasks" and can be undermined if attention is diverted, even briefly. In the HSE guidance, driving a car is used as an example of a common skill-based task. A brief interruption of concentration when driving a car can result in

veering off the road or hitting another vehicle. The speed and environment will also have a bearing on any resulting incident, but the initial slip or lapse could be viewed as the underlying cause.

Even the most experienced, motivated, and trained people can be susceptible to slips and lapses. Examples can include steps missed in performing repairs, maintenance, calibration or testing of equipment. It is important to be aware of these types of errors and implement suitable equipment design and tasks to try and prevent their occurrence. Adequate supervision is a good opportunity to detect and correct such errors. Slips and lapses should be considered during incident and accident investigations and workers should be made aware of them.

- Slips: These are failures in carrying out the actions of a task. They are described as ‘actions-not-as-planned’. Examples would be:
  - Picking up the wrong component from a mixed box.
  - Operating the wrong switch.
  - Accidentally carrying out an action with too much or too little strength (e.g. over-torquing a bolt).
  - When driving, pressing the brake instead of the accelerator.
  - Dropping an object when handling it.
- Lapses: Forgetting to carry out an action, forgetting the place in a task or not remembering what was intended. Minimising distractions and interruptions to tasks and giving reminders can reduce lapses, especially for tasks that can take some time to complete or involve periods of waiting for a process to finish before continuing. The HSE guidance suggests that a useful reminder is often a checklist placed in a clearly visible location for the person doing the task. Again, equipment and task design can help reduce this type of error.

Examples of lapses taken from the guidance include:

- Turning a control knob to the right rather than the left or moving a switch up rather than down.
- Doing the right thing but on the wrong object (e.g. switching the wrong switch).
- Trying to use equipment before turning on the power supply.
- Using equipment after forgetting to do a pre-use check.

Slips and lapses can be minimised and mitigated through:

- Workplace design.
- Effective fatigue management (i.e. making sure people do not get too tired), such as considering fatigue when deciding on shift patterns and break times.
- Use of checklists.
- Independent checking of completed work (aircraft engineers often work in pairs and check each other’s work).
- Discouraging interruptions.
- Reducing external distractions.
- Active supervision.

**Mistakes** are made when the wrong action is taken believing it is actually correct. It is more complex than the slips or lapses as it involves the conscious process of planning, assessing and judgement. There are two types of mistakes - **rule-based** and **knowledge-based**.

- **Rule-based mistakes:** Based on rules and procedures that are remembered. People will generally opt for familiarity even if they are not efficient or convenient. An example of this is when people exit a building on hearing a fire alarm. The majority of people will exit the way they normally do rather than take an emergency exit that may be closer.

An example of a rule-based mistake from the HSE guidance involves a worker who was very familiar with the task of filling a tank. He expected the filling procedure to take about 30 minutes. However, on one occasion, the diameter of the pipe entering the tank had been changed to a pipe with a larger diameter which resulted in the tank filling more rapidly than on previous occasions. The worker ignored the alarms indicating the fill level was too high, based on his previous experience of the tank filling more slowly. As a result, the tank overflowed.

The 'rule' the worker followed was that the tank was known to fill up in about 30 minutes. The operator followed the rule, and ignored the alarm indicating something had gone wrong. Had the worker been advised that the pipe diameter had been changed, he would have altered this 'rule'. In this scenario, improved communication and adhering to the alarm would have resulted in a different outcome.

- **Knowledge-based mistake:** In unfamiliar circumstances, we must revert to consciously making goals and developing plans and procedures. Planning or problem-solving needs us to reason from basic principles or use analogies (similar situations). Misdiagnoses and miscalculations can result when we use this.

Example: A construction vessel was unable to avoid a cyclone because the operator failed to initiate preparations to evacuate in a timely manner. The risk of tropical lows rapidly developing into cyclones within the Timor Sea location was not well understood, with insufficient time allocated for evacuation tasks. The operator did not know how quickly the cyclone could develop.

Mistakes can be minimised and mitigated through:

- Robust competency assurance processes.
- Good quality training.
- Proactive supervision.
- A team climate in which co-workers are comfortable observing and challenging each other.

## Violations

Where a person makes a conscious decision to deviate from a rule, procedure, regulation, or instruction, this is known as a **violation**. In a work environment, this can include actions such as removing a guard from a piece of equipment, overloading a forklift truck, or not wearing PPE that is provided for a task. Violations are a direct cause of a significant number of injuries and incidents at work.

Violations can be made when a worker does want to complete a task but would prefer to do it faster or without having to do what they perceive as "unnecessary". Often this is driven by high performance targets or a desire to please. It is rare that violations are a result of wilful damage or sabotage.

Violations are categorised as follows:

- Routine
- Situational
- Exceptional

## **Routine Violations**

This is where rule-breaking has become an accepted and "normal" practice within a group of workers often motivated by:

- A desire to save time and energy (a bad work ethic that is from the worker, not the employer).
- Feeling that the rules constrain the task at hand (the task is easier to complete without rules/safeguards).
- A belief that the rules do not apply (possibly due to violation being tolerated for so long).
- The rules are not enforced (lack of suitable supervision).

### **Example of a routine violation:**

1. The introduction of hearing tests in a manufacturing organisation discovered that two thirds of workers were suffering from noise-induced hearing loss. An investigation by the new Risk Manager found that hearing protection was made mandatory in 1990 but had never been enforced or worn by line-management. Whilst everyone had previously been briefed to wear their hearing protection, since no one did wear it, and no one challenged this violation, it had become routine.
2. A common routine violation is where workers are requested to smoke at least 10 metres from the entrance of a building. However, it has become accepted that this is not enforced as one of the senior managers smokes immediately outside of the main entrance.

It is important to keep up to date with risk assessments to highlight problem areas along with keen supervision from supervisors and line managers that are confident in raising issues with established workers.

## **Situational Violations**

This is similar in some ways to the routine violation, but the underlying cause is slightly different, and it is usually a "one-off" violation. Situational violations can be due to performance expectations being high which puts a pressure on workers to complete tasks more quickly. Expectations can mean that there are less workers, a lack of equipment and an expectation to work in unsuitable weather conditions. As opposed to the routine violation that is worker initiated in saving time and energy (see above), this scenario represents conditions imposed on the workers from the employer.

It may be that workers appreciate that the conditions are not safe and to combat the scenario where situational violations occur, employers should ensure that there is the opportunity to report situations through open communication where workers are confident there will be no reprisal. Regular reviews of risk assessments and controls will also help in this area. If there is no opportunity to communicate concerns or risk assessments are not updated, there is the possibility that over time, the violation will become routine.

Examples of situational violations:

1. At BP's Texas City refinery, an explosion occurred when the day-shift supervisor left work at short notice to attend to a family emergency. BP procedures required the presence of an experienced supervisor during start-up activities for the raffinate unit (raffinate is where oil is extracted from crude). A replacement supervisor was not assigned as managers felt that there was sufficient experience among the remaining workers to perform the start-up competently, based on their experience. Unfortunately, critical steps were missed, and an explosion occurred. This example demonstrates how violations are also committed by decision-makers, not just by frontline personnel.

2. Another example is where an engineering company received an emergency order. Process staff were granted a limited amount of overtime but were expected to achieve higher than normal productivity during this time. As a result, corners were cut and a worker trapped their hand in a lathe, having removed the guard so that he could work faster. The result was the loss of his index finger.

### Exceptional Violations

This type of violation is rare and often used in an emergency or abnormal situation. It is usually when something has gone wrong, and application of usual rules will not help to rectify the matter. It is a conscious decision to violate known rules and procedures but in a high-pressure situation when the rules may possibly be ineffective. The decisions are usually made quickly and without much thought for any ramifications, or a knowledge that the ramifications will be insignificant in comparison to the current situation.

Example of an exceptional violation:

It is prohibited on deep sea rigs to jump off into the sea. However, during the Piper Alpha disaster, personnel following the muster procedures found that they could not access the lifeboats from the accommodation block. Workers quickly realised the only way off the platform was to jump off into the ocean. Despite this being a violation, the result for many was survival.

Violations can be minimised and prevented through:

- Education about risks and consequences.
- Training in 'why' things are done in a certain way. Not just 'how' it should be done.
- The use of decentralised decision-making structures.
- Dedicated site-based roles of procedure modification approval.
- Allowing sufficient time for risk management activities.
- The use of lead indicators as targets.
- Active workforce involvement in the development of rules and procedures that will affect them.

### The application of Cognitive Processing, Knowledge-Based, Rule-Based, and Skill-Based Behaviour

Jens Rasmussen was a highly influential system safety and human factors professor at Risø in Denmark. He was specialised in safety science, accident research and human error.

Rasmussen describes three levels of behaviours.

- Skill-based
- Rule-based
- Knowledge-based

#### Skill-Based Behaviour

Rasmussen describes the simplest form of behaviour as *skill-based behaviour*. It is at the lowest level of the cognitive processing hierarchy, and often characterised as automated and taking place without conscious actions or decisions.

Examples of skill-based behaviours are bicycle riding, driving a car or playing a musical instrument.

## Rule-Based Behaviours

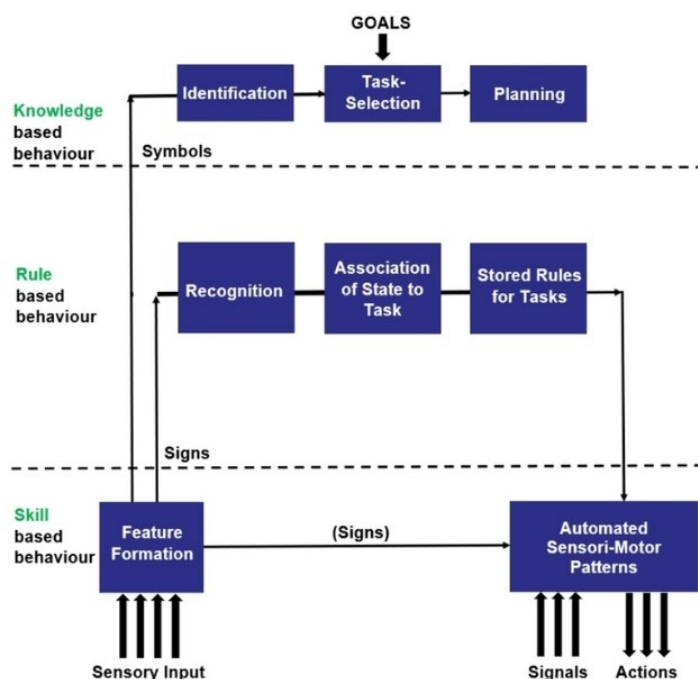
The next level of complexity is *rule-based behaviour*. It is controlled by the middle level of the processing hierarchy and may be characterised as consisting of "a sequence of subroutines in a familiar work situation", where the subroutines follow previously stored rules.

Examples of rule-based behaviours are mathematical problem-solving and system control tasks such as the discrete manoeuvring of aircraft or cars.

Rasmussen explicitly warns that the boundaries between skill-based and rule-based performance are not quite distinct, varying with both level of training and attentional state. The test is this: rule-based control is ultimately based upon "explicit know how" i.e. the rules can be explained in words by the person concerned. If you cannot explain it then it must be skill-based.

## Knowledge-Based Behaviour

The highest level of complexity is *knowledge-based behaviour*. It is controlled by the highest level of the processing hierarchy and relies upon a "mental model" of the system in question. It requires people to think very carefully. Knowledge-based behaviour is, therefore, what you have to turn to only when skill-based or rule-based are not up to the task at hand. Examples of knowledge-based behaviour are problem-solving and fault diagnosis.



## Human factors

### What are human factors (ref. HSG 48)

The UK HSE publication "HSG48: Reducing error and influencing behaviour" states that:

*'Human factors refer to environmental, organisational, and job factors, and human and individual characteristics, which influence behaviour at work in a way which can affect health and safety.'*



It goes on to say that three interrelated aspects that must be considered: the job, the individual, and the organisation.

## Job factors

According to the HSE:

*"Job-related factors include areas such as the nature of the task, workload, the working environment, the design of displays and controls, and the role of procedures. Tasks should be designed in accordance with ergonomic principles to take account of both human limitations and strengths. This includes matching the job to the physical and the mental strengths and limitations of people. Mental aspects would include perceptual, attentional, and decision-making requirements".*

## The role of ergonomics in job design

Ergonomics is a science concerned with the 'fit' between people and their work. An official definition from merriam-webster.com/dictionary states ergonomics is.

*"An applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely" and "the design characteristics of an object resulting especially from the application of the science of ergonomics".*

It puts people first, taking account of their capabilities and limitations. The publication INDG90 by the HSE: Ergonomics and Human Factors at Work states "Ergonomics aims to make sure that tasks, equipment, information and the environment fit each worker.

Most people have heard of ergonomics and think it is something to do with seating or with the design of car controls and instruments, and it is, but it is so much more. Ergonomics applies to the design of anything that involves people, with a view to ensuring that health and safety risks are minimised.

According to ergonomics.com.au "To achieve best practice design, Ergonomists use the data and techniques of several disciplines:

- Anthropometry: body sizes and shapes within populations
- Biomechanics: muscles, levers, forces, strength
- Environmental physics: noise, light, heat, cold, radiation, vibration
- Body systems: hearing, vision, sensations
- Applied psychology: skill, learning, errors and differences
- Social psychology: groups, communication, learning, behaviours

General problems with poor ergonomics include:

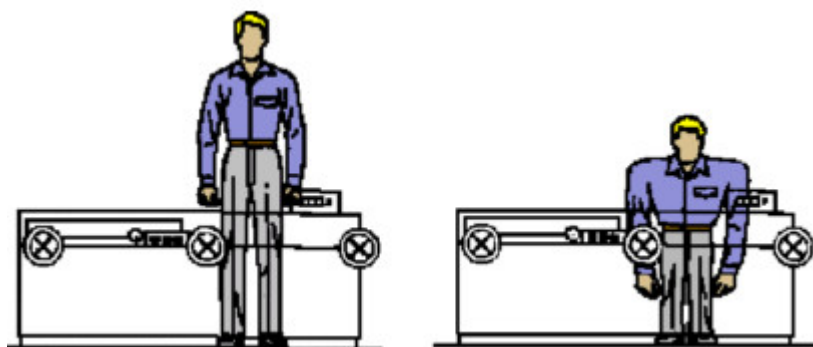
- Unable to see important displays.
- Unable to reach controls.
- Unable to work in a comfortable position.
- Overloaded with too much information at one time.
- Inattentive, because there is too little to do.

## Influences of Process and Equipment Design on Human Reliability

In every workplace, there is a reliance on interaction between workers (humans), equipment and work processes. When this interaction breaks down (sometimes called "human error or failure") it can have severe health and safety implications and so in order to control the risk of error due to a breakdown in interaction, the way systems are designed to integrate workers, process and equipment should be carefully designed and monitored.

Few workstations are 'made to measure' owing to the wide range of human dimensions and the sheer cost of designing individual workstations and machines to conform to individual body measurements.

The drawings below illustrate an example of a problem that can occur when ergonomics is not considered in the design process. The drawing on the left shows a lathe with a "normal" sized man standing next to it. The drawing on the right is the same lathe with a man having the body he would need to operate the lathe as it was designed. Because workers are not built this way, the "normal" worker would be required to bend over, move, and reach to the right and left to operate this lathe. The ideal operator would be 1.35m tall with a 2.44m arm span.



*On the left, a man of "average" proportions. On the right, the man whose proportions are suitable for the lathe.*

This diagram was labelled "The Cranfield Man" due to the dimensions for operating the lathe were produced by the Cranfield Institute of Technology. Cranfield man was 1.35m tall, with shoulder width of 0.61m and arm span of 2.44m.

This specific workstation will require the worker to stoop to operate the lathe. Alternatively, a seat could be provided. This is an example of something that will need to be assessed before the worker starts an operation.

The UK Kegworth air crash in 1989, in which 47 people died, was because the pilot shut down the wrong engine when a fire broke out in one of the plane's two engines. The pilot and co-pilot had limited experience flying the newer Boeing 737-400 and were unaware that there had been a design change from the older 737 that they were used to flying as the control panel had been modified.

This had a direct bearing on the error in shutting down the good engine.

## The Employee and the Workstation as a System

A system is "a set of interacting or interdependent system components that form an integrated whole".

Previously, we have said that a system is:

Inputs - Process - Outputs, the "whole" influenced and operating within an Environment.

All machines and workstations have an interface or "man-machine" interface. The operator manipulates part of the machine (e.g. a button, a control) which communicates a message to the machine (e.g. turn on, turn off, go faster, turn right). The machine will receive the message, will perform an action, and will communicate back to the operator (either by carrying out the action, or by sending a signal to the operator). The operator must be trained how to operate the machine, and what "inputs" are needed and when. The machine carries out the "process" and produces "outputs".

Operating a machine is almost like two-way communication. The operator gives a command, the machine acts and communicates back. Depending on the information received, the operator then must decide on what command to give next to carry out the process. The information passed by the machine must be understandable.

If too much information is received by the operator, they may not be able to mentally process it, and they may make a mistake. It is vital that the design of the man-machine interface takes into account the limitations of the human information processing system.

The man-machine interface is usually made of displays and controls, whether it be a vehicle, a computer, or a machine. Displays and controls must be designed with human expectations in mind. Which way do we expect to turn a tap or a valve to open it? Clockwise or anti-clockwise?

In an emergency, the design is crucial. Emergency situations do not lend themselves to lengthy thinking time. Humans will need to act instinctively, based on their experiences and expectations. The designer must consider issues as:

- The expected colour of the start button.
- The expected location of the emergency stop control.
- Which side the hot tap is expected to be on - the left or the right.

## **Elementary Physiology and Anthropometry**

### **Physiology**

Physiology may be defined as *"the way in which a living organism or bodily part functions"*.

Physiology is a biology branch which relates to organ functionality and how they work with each other to ensure conditions are favourable for survival.

It is important for the Health and Safety Professional to have some knowledge of physiology when involved in assessing the risks presented by certain workplace hazards. For example, workers working in the heat (hot climate, or foundry) or cold (cold climate, or cold storage place) combined with work type and rate can experience serious physiological effects (heat stroke or hypothermia). Studying the effects can help determine the best way of reducing the risks (such as revising work rates, job rotation, breaks, hot or cold drinks, suitable clothing).

### **Anthropometry**

Anthropometry is defined as *"the scientific study of the measurements and proportions of the human body"*.

A key feature of ergonomic design is matching people to their equipment. Anthropometry is defined in the book Human Factors and Behavioural Safety by Jeremy Stranks as *"the study and measurement of body dimensions, the orderly treatment of resulting data, and the application of those data in the design of workspace layouts and equipment"*.

Anthropometry is a key feature of ergonomic design, by matching people to the equipment that they use in the workplace. Anthropometry is particularly important where complex equipment or machinery is being designed or in situations where the performance of the operator is critical (such as layout of controls in the cockpit of an aeroplane).

Often, the position and layout of equipment controls, dials, and gauges are determined by the engineering requirements for the equipment. Little consideration is given to the person who will be operating the machine. This is probably because, in the past, the operator has adapted to the poorly designed controls despite perhaps experiencing discomfort and restraints. Such discrepancies have led to accidents because of operator error.

Designs that are unsuitable for normal body size and movements may cause incidents such as exposures caused by inadequately fitting PPE or seat belts being too short so not worn; therefore, the workplace should be designed as per the size of the user.

Anthropometry tables give measurements of different body parts for men and women, and split into different nationalities, and age groups, from babies to the elderly.

Therefore, when designing equipment/machinery, you need to know who the design is for, the user population. There is no point designing an office chair using children's dimensions or designing appliances such as kettles with children in mind.

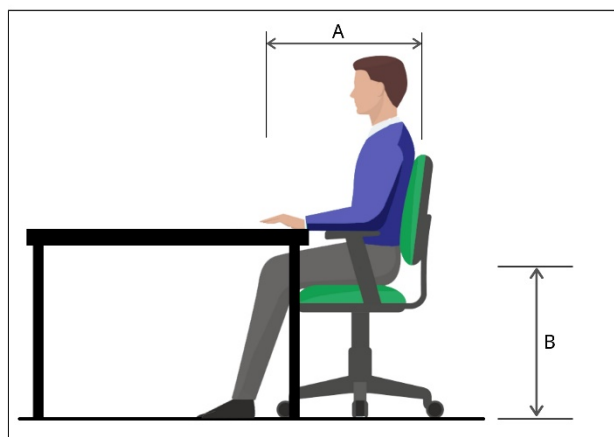
The sketch below shows the data gathered to aid the design of a study desk.

## Ergonomics

Product: Writing Desk/Study Table

Description of measurements I intend to collect: I intend to collect measurements based on the average reach of a person, DISTANCE A and comfortable seating height DISTANCE B. Target market - House/flat owners

PUPIL / PERSON	Measurement(s)			
	A	B	C	D
PERSON A	600mm	450mm		
PERSON B	534mm	436mm		
PERSON C	589mm	425mm		
PERSON D	590mm	395mm		
PERSON E	610mm	412mm		
PERSON F	500mm	423mm		
PERSON G	615mm	428mm		
PERSON H	602mm	422mm		
PERSON I	590mm	480mm		
PERSON J	595mm	435mm		
PERSON K	605mm	456mm		
PERSON L	625mm	400mm		
TOTAL(S)	7055mm	5162mm		
AVERAGE	588mm	430mm		



HOW THE DATA WILL HELP ME DESIGN:

I will use the average measurements for distance 'A' and 'B' to calculate the overall size of the study desk I am designing. This research will also help me design a desk that is comfortable to sit at and to use for studying.

### Anthropometric data related to the design of a desk

Typical data that may need to be collected for say, a range of workplace vehicles, includes:

- Sitting and standing height
- Arm length
- Arm reach, forwards, sideways, upwards, and downwards
- Hand and finger size

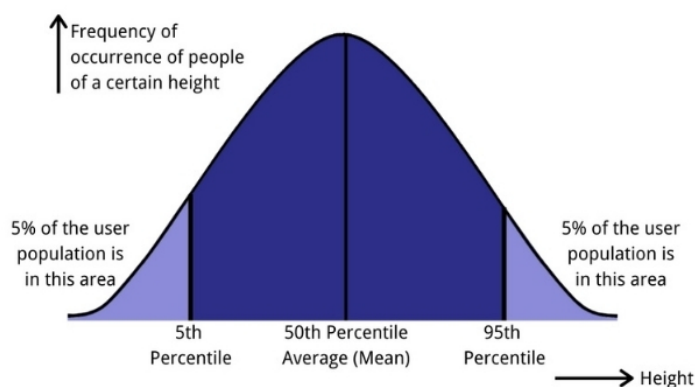
- Grip strength
- Strength of individual muscle groups

The objective of collecting data is to gather information of some or all the above physical characteristics for a given worker population. The data that is gathered should allow work equipment to be designed so that the equipment will accommodate a chosen proportion of workers within that range (which may vary between 70 and 90% of the population).

## Percentiles

In anthropometry tables, percentiles are included to state if the measurements in the table relate to an average person or someone outside of the normal ranges/dimensions.

Adult heights will vary, but most will be around the same height, with a few taller or shorter than the majority. The height of the majority will be near the average (known as the 'mean' in statistics). In anthropometry, this 'mean' is known as the fiftieth percentile, the most likely height of the group. If the group's heights were plotted onto a graph it would look like this:



### *A bell curve showing basic percentiles*

The example graph shows 50% are average height or smaller and 50% are average height or taller.

Values at either end of the graph are smaller as there are fewer people smaller or taller than this height.

The left of the average shows the 5<sup>th</sup> percentile as 5% of the people (1 in 20) are shorter than this. At the other side, you have the 95<sup>th</sup> percentile where only 1 person in 20 is taller than this height.

This type of information is especially useful for designing. If something is designed correctly it can be useable by 95% of the people who may use it.

A good example of this is the design of door heights. When designing door heights, you would use the 95<sup>th</sup> percentile and design for the taller people as those shorter would be able to easily use the door. You design to the higher value to accommodate the majority of people.

Alternatively, if you are looking at the design of a car dashboard and wheel you would need to ensure that everyone would be able to access all the controls and buttons so the design would be based around the 5<sup>th</sup> percentile group. If those with smaller arm lengths can reach everything then everyone else with longer arms will also be able to.

Here are some examples of design features which use percentiles:

What are aiming for with your design?	Design examples:	Examples of measurements to consider:	Users that your design should accommodate:
Easy reach	Vehicle dashboards, Shelving	Arm length, Shoulder height	smallest user: 5th percentile
Adequate clearance to avoid unwanted contact or trapping	Manholes, Cinema seats	Shoulder or hip width, Thigh length	Largest user: 95th percentile
A good match between the user and the product	Seats, Cycle helmets, Pushchairs	Knee-floor height, Head circumference, Weight	Maximum range: 5th to 95th percentile
A comfortable and safe posture	Lawnmowers, Monitor positions, Worksurface heights	Elbow height, Sitting eye height, Elbow height (sitting or standing)	Maximum range: 5th to 95th percentile
Easy operation	Screw bottle tops, Door handles, Light switches	Grip strength, Hand width, Height	Smallest or weakest user: 5th percentile
To ensure that an item can't be reached or operated	Machine guarding mesh, Distance of railings from hazard	Finger width Arm length	Smallest user: 5th percentile Largest user: 95th percentile

### *Examples of designs, and how anthropometrics and percentiles are used*

Over the past decades, greater attention has been paid to anthropometrics in design, particularly in the design of machinery. This can be seen in the improved design of controls and displays on motor vehicles, cranes, aircraft, computer terminals, and processing machinery, the objective being to reduce operator fatigue and error, which lower productivity and contribute to accidents.

### **The Degradation of Human Performance Resulting from Poorly Designed Workstations**

The aims of ergonomics are to design the equipment and working environment to fit the needs and capabilities of the individual, and to ensure that the physical and mental wellbeing and limitations are being considered and met. The layout of controls and displays can influence the safety of the equipment or process. If the layout and workstation are poorly designed, human performance will deteriorate in several ways. Common problems are:

- Switches that can be accidentally switched on or off.
- Control panel layouts that are highly complex, illogical in positioning, and generally hard to understand. This can lead to confusion, delays in decision-making, and incorrect decisions.
- Displays which force the user to bend, stretch, or squint to see them properly. The operator may misread the display.
- Badly identified controls which the operator could select by mistake, believing it to be a different control.
- Emergency stop buttons which are difficult to reach, resulting in a slight delay before the button is activated.
- Poor lighting conditions which make displays difficult to read. For example, reflections or glare from lights onto glass displays.



***An example of a control panel***

To prevent the degradation of human performance, there are a number of desirable design features for control panels and displays.

- Controls:
  - The number of controls should be sufficient to control the process or operation. However, the number of controls should also be kept to the minimum necessary. There is a fine balance to be achieved. The operator must be able to control the process, but must not be overwhelmed by the number of controls.
  - The state or condition of the process should only be changed by operation of a control.
  - If the process comes to a halt, either intentional or a non-intentional, restarts should only occur after activating a restart control. Under no circumstances should the process restart automatically.
  - The process should give immediate feedback that a control has been activated. This could be through an obvious reaction such as the process visibly starting, or by some signal (light, sign, sound) confirming the command has been received. The operator should not be in doubt if the control is working.
  - The stop function should always override all other controls, such as start controls.
  - The stop function should be easy to activate. There should be no keys required or other obstacles to stop the operation.
  - All controls should be visible from the position of the operator.
  - The controls should be laid out in a logical position. This is normally following the sequence of the process. For example, the controls could be laid out from left to right, with the first parts of the process on the left, and the final parts of the process on the right. Alternatively, if the operator is standing at the end of a production line, the controls at the top of the panel could control the start of the line (furthest away from the operator), and those at the bottom of the machine at the end of the line (closest to the operator).
  - Controls should be easily reachable. Controls that are needed more often or urgently should be close to the operator.
  - All controls should be easily identifiable, either by their shape, colour, or thanks to labelling.
  - Controls should be protected against accidental activation. For example, the use of a key for starting the process, or two-handed controls where both controls must be activated at the same time.
  - Some controls can be interlocked with other controls. For example, one control will not work unless another control has already been activated. For example, a process might not be able to start unless the ventilation has already been switched on.
  - The type of control should be appropriate to the amount of control needed by the operator. If the control is simply on or off, then a simple switch is sufficient. But, if the operator needs very close and fine control, then a knob, lever, or dial would be more appropriate.



- All switches, knobs, dials, levers. should be set to turn the same way, and generally match expectations and conventions. For example, a switch should be off when it is up, and on when it is down. If turning a dial to the right signifies an increase, then all dials should be set to increase when turned to the right.
- Controls should be positioned to their respective displays. For example, a temperature control should be next to the temperature display.
- Displays:
  - The displays should show very clearly if the process or operation is within a steady state and operating within normal parameters.
  - If the process is operating outside of a steady state and is in abnormal condition, then the displays and dials should be marked very clearly to show this. For example, a dial might have a red area to show when the process is in an abnormal state.
  - The displays should be clearly visible to the operator and labelled so they are identifiable.
  - Displays should clearly indicate when the status of the process has changed or is changing. They should match expectations to be read conventionally. For example, red should signify that something is wrong, and green should signify that the status is good.
  - Displays can draw attention when urgent by appealing to multiple senses like sight and hearing. For example, lights can flash, and warnings can be audible.
  - The type of display should be suitable for the information to be read. On and off can be represented by a light which turns on or off. But adjustable data like speed, pressure, or temperature, can be read with an analogue gauge or a digital reading.
  - All gauges should indicate normal in the same position. For example, normal might be in the centre of the gauge, or situated to the left. The important thing is that all gauges match the expectations of the operators.
  - Lighting can be a problem. Glass gauges should be shielded from strong glare from ambient lights, otherwise the operator may not be able to easily see the reading. Other bulbs should also be shielded from strong ambient light. This will avoid situations where the operator has to shield the gauge with their hand to see what it says.
  - Displays should always be set against a background panel of neutral colour. This makes the reading more visible and assist those with some level of colour blindness.
  - As with the controls, there must be a balance in the number of displays. There should be sufficient displays to read and understand the current state of the process, but these should be kept to a minimum to avoid overloading the operator with unnecessary information.



*A larger control panel*

## Ergonomically Designed Control Systems in Relation to Human Reliability

In the following pages, we will discuss the design of the following types of control systems:

- Production process control rooms
- Crane cab controls
- Aircraft cockpits
- CNC lathes

### Production Process Control Rooms

Whether on a petrochemical site, air traffic control tower, fire station, or nuclear power station, the control room is at the heart of the operation. The control room operator performs a demanding job (particularly in the event of an emergency) in monitoring increasingly complex automated systems, where the consequences of error can be catastrophic.

Optimum control room ergonomics are critical in minimising the risk of human error. The major factors to be considered are:

- The control room and its operators are considered to be "a whole system".
- The control room structure must be suitable to withstand major hazard events, such as fires and explosions.
- The arrangement of the control room functions and activities.
- The arrangement of display screens and equipment.



*An example of a control room*

### Control Room Layout

Human performance is affected by the environment surrounding them. Even the most skilled operators are prone to human error and slow response because of a poor control room environment. Human factors must therefore be integrated early into the design, commissioning, and operation of the control room.

The control room arrangement should be designed to international and best practice standards to create an environment that minimises disruption to the operators, improves alertness and comfort and provides the required areas for each function.

The combination of, and interaction between, equipment and people, can determine overall operator comfort, which is why considering the control room and its operators as a whole system is important.

For example, display screen positions are optimised for maximum comfort and to ensure that critical information is in an operator's "primary display zone" and that controls are within reach.

Key elements of control room design include:

- The control layout must be designed following task analysis to ensure that user requirements for movement patterns are met.
- Necessary lines of sight and communication are uninterrupted to aid teamwork.
- Temperature, airflow, and lighting are adjustable to suit individual preference and external factors.
- The design of the man-machine interface should be after task analysis to ensure no under or over-arousal mental workload when dealing with specific tasks.
- Any alarms that are place should be clear, and in line with existing conventions.
- The anthropometry of the panels, control desks, and seating should suit operators and be suitable for 24-hour use to avoid problems with posture.

### **Crane Cab Controls**

It has been proven that an ergonomically designed workplace contributes not only to the health and safety of the crane operator and his/her environment, but also to the productivity of the crane.

The design process of a crane cab should start with an analysis of the crane's duties. The analysis should result in an optimum location for the operator. Most of the time, this location is determined by visibility of the process. However, an alternative location must be considered if the "supposed optimum" location places the operator in a harmful posture.

The next step is an analysis of the actions carried out by the crane operator. This is to provide the crane operator with the required controls and communication equipment designed in an ergonomic layout.

As a parallel task, the required posture of the crane operator must be studied. This usually results in a specific seat arrangement.

As a final task, the cab should be designed as a shell around the crane operator, protecting him/her from environmental influences (blast, heat and cold, radiation, incoming light, dust, gases, noise, vibrations, movements, pollution, etc.). This must be accomplished without introducing visual obstructions. Additionally, the crane operator should be provided with a supply of fresh air, ergonomically designed controls and control station, and optimum vision.



Because the number of seat arrangements produced for cranes is relatively small, the designs are derived mainly from other industries. The seat itself is commonly adapted from those produced for the truck industry. Many kinds of control stations are available in the market. However, the typical circumstances in cranes require specific qualities and adjustments. As a minimum, the size and adjustments must meet the 5 to 95 percentiles for males and females in the area of use. Suppliers must consider the size and adjustments useful for a wide range of body sizes. This kind of equipment requires a wide range of adjustments, which carries a risk of reduced quality and at times, fixed size compromises must be accepted.

## Aircraft Cockpits

According to aviation knowledge *"The evolution of cockpit design is credited to the advancement of Human Factors as a formal discipline. During the very early generations of flying, control of the aircraft was solely 'stick' and 'rudder' and was a manual operation. Therefore, cockpit design was very basic with very few instruments to provide the pilot with information on aircraft and engine performance, cockpits normally consisted of three or four major instruments and there were only controls for basic flight"*.

This has evolved over the decades into much more complex control systems, resulting in higher stress levels and error rates amongst pilots. Examples of this were missed signals, misinterpreted information, and limited detection and recognition of some instruments by flight crews.

Data shows that there was an increasing trend in the number of displays up until the 1980s where there was a sharp decrease. The reduction of the number of instruments in cockpit designs coincided with the industry's increased understanding of human failures, particularly in perception and human information processing.



**Old Cockpit**



**Modern cockpit**

"Anthropometry is an integral part of ergonomic design. For aircraft designers, anthropometry is not limited to the measurements alone but also who the targeted users and operators are. It is not feasible to design a cockpit for every individual in the world, rather a normal distribution is used where an aircraft is designed for the 5th to 95th percentile of the intended population". (Source: Churchill, E., Tebbetts, I., McConville, J., & Laubach, L. (1978). *Anthropometric source book. Volume I: Anthropometry for designers*. Merritt Island, FL: National Aeronautics and Space Administration (NASA)).



Anthropometry considerations in aviation include:

Body Dimensions	Clothing (including gloves, shoes) of crew uniform
Hand size	Size, location and layout of button, switches, levers and small controls. Maintenance access for engineers
Length of arms and legs	Reach envelope for control locations
Sitting eye height	Seat adjustment to establish correct eye datum
Sitting height, sitting knee height and thigh thickness	Control column yoke clearance, desk and console design
Standing height	Ceiling and door height limitations, overhead panel reach
Sitting elbow rest height/length	Armrest location
Body width and thickness	Fuselage, passageway, door and hatch size limitations
Thigh length	Seat length
Foot size	Foot location, space and controls (rudder and brakes)
Muscle strength	Control feedback forces (real or artificial). Service and maintenance requirements. Portable equipment weights

### ***Anthropometry considerations in aviation***

The following information on aircraft controls is taken from aviationknowledge.wikidot.com.

"The design eye position, also known as eye datum or design eye reference point (DERP) is one of the key aspects of cockpit design. A pilot should be able to view all the main cockpit instruments while maintaining a reasonable view of the outside world with minimal head movement. The instruments should be located high enough for easy viewing but low enough so that it does not obstruct the view of the runway ahead during take-off and landing.

To operate the aircraft as intended it can be seen that all pilots must use the same reference datum. This is normally achieved by adjusting the seating position in both vertical and fore/aft axis. Some aircraft will also have adjustable rudder pedals and/or control yoke/joystick to ensure the pilot's view is in alignment with the design eye position. To highlight the significance of the design eye position, sitting just 1 inch below the reference point on a Boeing 767 will result in losing 40 meters of ground vision during final approach.

Rarely does the cockpit design take precedence over the aircraft fuselage shape. A compromise therefore exists between the ergonomics and anthropometry of the cockpit and the aerodynamics and strength of the aircraft body. Nevertheless, the cockpit should be designed to be as spacious as possible. One way to achieve this is by de-cluttering the cockpit, position of a control will be based on the importance and frequency of use, as well as whether the requirement exists between having it duplicated or shared.

Airline pilots remain seated for an extended period of time, long haul routes are often in excess of sixteen hours. While the importance of seat comfort itself is explanatory, there is also big emphasis on designing a seat that offers sufficient back support.

Humidity and illumination can also affect pilot comfort. Most large aircraft cockpits have a separate environmental control panel for pilots to regulate the ambient temperature.

Displays and feedback can be visual, audible, or tactile. While visual is the main form of display in the cockpit, audible and tactile have their uses as well. Audible warnings from the likes of ground proximity warning system

(GPWS) or traffic collision avoidance system (TCAS) and tactile warnings such as the stick shaker are powerful aids for the aircraft to communicate and alert the crew.

As mentioned previously the display in the modern cockpit is designed around the design eye position. Ideally all displays should be large, legible, well lit, and easy to operate. Due to workspace constraints, however, more prominent, and frequent displays will have priority over ones that are less essential.

Illumination and colour play a vital role in instrument displays. Instruments and controls can be lit internally, externally, or both. Aircraft designers need to ensure lighting does not create glare or shadows and produce the correct brilliance for day and night operations. There should then be a way for pilots to fine tune the luminosity to accommodate each individual's light sensitivity. Modern day LCD screens on glass cockpits have a narrower field of vision, however, if the pilot is seated aligned with the design eye position the display should not interfere with everyday operations.

The correct use of colour schemes can aid in alerting the crew if something needs to be brought to attention. Using too many different colours however may clutter the screen and cause confusion. The main colours used for system monitoring are green (normal), amber (caution) and red (alert or emergency).

Aircraft controls supplement aircraft displays in communicating to the pilot. It provides a two-way interaction between the aircraft and the crew. Controls should be easy to reach and be positioned appropriately in accordance with their usage. Controls which are used frequently should be positioned in a more prominent position.

Standardisation is important to avoid unnecessary confusion. Although different aircraft manufacturers have their subtle differences, generally the layout of controls and gauges are set in the natural sense. Good aircraft type knowledge may not always prevent inadvertent actions. The Beech Bonanza, a popular light twin, initially had the gear lever positioned on the right side of the throttle quadrant, a position commonly used for flap settings. This resulted in numerous gear up landings where pilots raised the gear during short finals when the intention was to lower flaps. The manufacturer soon repositioned the gear lever as well as adding a squat switch to prevent the gear rising below a certain power setting. The accident records for gear up landings on the Bonanza is about 40% higher on the earlier non-standard cockpit layout aircraft than the later revised models".

## **Computer Numerical Controlled (CNC) Lathes**

During recent years, there has been increasing use of innovative technologies in manufacturing. A huge amount of physical workload has been replaced with computer-controlled units. Because of this, machine operators today mostly have an observational function. This causes increase of static work (e.g. standing and sitting) and cognitive demands (e.g. process observation and decision-making). Machine operators have a high responsibility, because mistakes may lead to human injuries as well as to product losses, and in consequence may lead to high financial losses for both the operator and the organisation.

### **How CNC Machines Work**

According to [brighthubengineering.com](http://brighthubengineering.com):

*"The CNC machine comprises of the computer in which the program is fed for cutting of the metal of the job as per the requirements. All the cutting processes that are to be carried out and all the final dimensions are fed into the computer via the program. The computer thus knows what exactly is to be done and carries out all the cutting processes. The CNC machine works like a Robot, which has to be fed with the program and it follows all your instructions."*

*Some of the common machine tools that can run on the CNC include: Lathes, Milling machines, and Drilling Machines. The main purpose of these machines is to remove some of the metal to give it proper shape such as round, rectangular, etc. In the traditional methods, these machines are operated by the operators who are experts in the operation of these machines. Most of the jobs need to be machined accurately, and the operator should be expert enough to make the precision jobs. In the CNC machines the role of the operators is minimised. The operator must merely feed the program of instructions into the computer, load the required tools into the machine, and the rest of the work is done by the computer automatically. The computer directs the machine tool to perform various machining operations as per the program of instructions fed by the operator".*



**CNC Lathe**

## **Matching the job to the person**

Assigning the right employees to specific jobs with safety in mind helps reduce injuries regardless of an employee's age. This means consideration of not only an employee's physical capability (if appropriate) but also mental capability. Some employees are perfectly happy to undertake mundane tasks which may require physical exertion but would be uncomfortable in carrying out complex tasks which require a lot of mental processing and decision making.

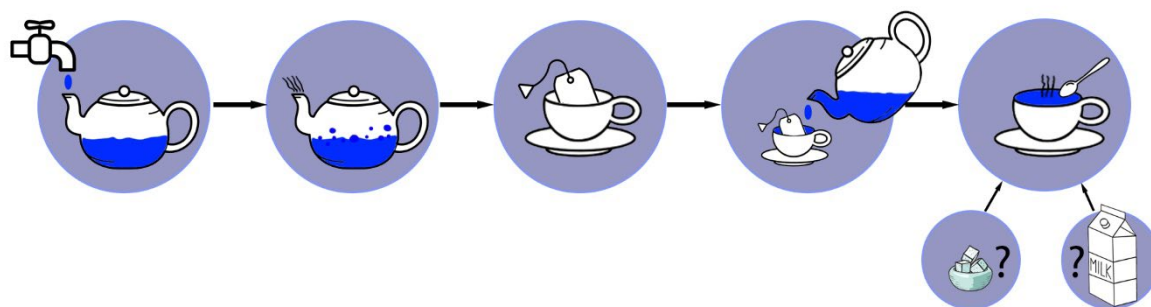
However, older employees are more likely to experience decreasing physical capabilities, such as ageing musculoskeletal systems, the onset of arthritis, eyesight deterioration, slower reaction times and longer durations for recovering from injuries.

Research has suggested that there is a need for employers to tailor specific loss prevention measures to fit employee demographics while assuring that the job is an appropriate match for the individual performing the task.

Some tasks are more complex than others. Highly complex tasks have many opportunities for human errors and failures. Every step of the task has the potential for a slip or a lapse, and every decision point has a potential for a mistake, or a violation. Ideally, tasks should be designed to be as simple as possible, requiring the minimum number of steps and decisions. This will minimise the potential for mistakes. However, this is not always possible. Therefore, it is helpful to sometimes break tasks down into sub-tasks consisting of no more than 5 or 6 steps. When instructing workers on how to complete a task, first they should understand what the overall task consists of i.e. what is the overall goal, what will the end result look like? Then the workers should see a list of the sub-tasks, so they understand the basic process to be followed. Then each sub-task can be looked at in detail.

The instructions for highly complex tasks should be in written format, clearly understandable so these can be referred to. Checklists are also very useful, for workers to check that they have completed each step in the required sequence. Pictorial representations can also be used as shown below:





## The Application of Task Analysis in Predicting the Probability and Prevention of Error

Task analysis methods are used in assessing and reducing human error. They can be used to remove the conditions that lead to errors before they happen. They are useful in the design stage of a new system, in the modification of an existing system and as an audit tool for exposing systems. There are a wide variety of different methods but for this course, the focus will be on one particular method: Hierarchical Task Analysis.

### Hierarchical Task Analysis (HTA)

According to the Task Analysis Techniques by David Embrey from Human Reliability Associates Ltd "*Hierarchical Task Analysis is a systematic method of describing how work is organised to meet the overall objective of the job*".

It involves identifying in a top-down fashion, the overall aim of the task, then the various sub-tasks and the conditions under which they should be carried out to achieve that aim. In this way, complex planning tasks can be represented as a hierarchy of "operations" and "plans".

Hierarchical Task Analysis starts by stating the overall aim that the person must achieve. This is then re-described into a set of objectives specifying when and how they should be completed.

Whether it is necessary to break down an operation to a finer level of detail depends on if there is a significant error mode likely to be revealed by a more detailed analysis. For example, the operation 'charge the reactor' may be an adequate level of description if the likelihood of error is low, and/or the consequences of error are not severe. If the consequences of not waiting until the right pressure were serious or omitting to check the pressure was likely, then it would be necessary to break down the operation 'charge reactor' to its component steps.

Until the task is broken down further, it is difficult to see how a sub-operation at the next lower level of breakdown might fail, and what the consequences of this failure might be.

In practice, the general quality of the training, supervision, and procedures in the situation being evaluated will give a good indication of the overall likelihood of error. The consequences of errors can then be evaluated in terms of the overall vulnerability of the sub-system to human error.

The HTA has four main components:

- The goal
- Operations and sub-operations
- Plans
- Preconditions

Each of the components is analysed for potential failure such to assess the results of human error as per the following examples:

- The operator has the wrong goal.
- What the operator would or could do if a precondition is not available.
- A plan is carried out in the wrong order, or not carried out.

To completely assess human error risks the operational failures that might occur in each task step is also covered a "walk-through/talk-through" analysis.

### **Walk-Through/Talk-Through**

This is often used in training or during safety inspections or tours. An experienced worker will demonstrate and explain a process such as using a piece of equipment to other less experienced workers or to a health and safety team.

For proactive task analysis this is assessed by the team to pinpoint human error possibilities and how it can impact the process. This is a good way to identify hazards and risk based on human behaviour within a process.

### **Link Analysis**

This utilises information that is obtained in a walkthrough/talk through analysis and analyses the relationship between all of the operational or group of tasks that is carried out by the worker or operator. It looks at the physical space that is required and how the operator moves between tasks or sub-levels of the task. It can identify procedures or processes that are inefficient.

Link analysis is often used in designing control panels and workstations. It can also be used in planning new manufacturing plants or in plant equipment used in construction activities.

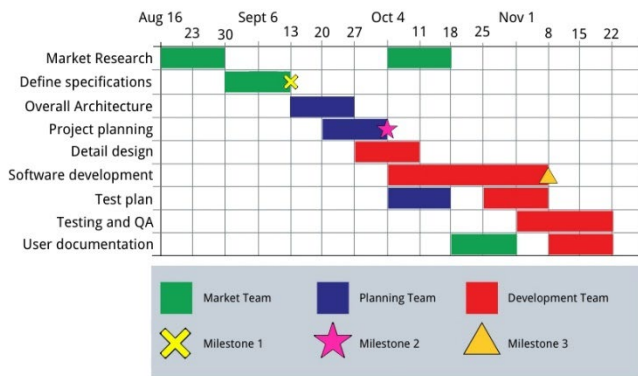
### **Timeline analysis**

This is often used in the construction industry or for complex projects where many people or groups are involved. It is a physical tracking or plan which outlines:

- The timescale that each person or group will spend on a task
- Who the group or individual is
- What tasks they will be undertaking.

A good example of a timeline analysis is a Gantt chart which is usually also colour coded to represent different tasks or groups.

## Multi-colour Gantt Chart



## Individual Factors

### Relationship between Physical Stressors and Human Reliability

Workers can encounter a broad range of physical stressors in the workplace, they include:

- Inadequate workspace
- Poor levels of lighting
- Noise and vibration
- Temperature extremes

Inadequate workspace can lead to congestion, which in turn can lead to increased risk of accidents and can also increase the risk of transmission of minor infections (such as colds), leading to reduced worker performance.

Poor (low) levels of lighting can result in visual fatigue, not only leading to an increased risk of accidents but again, to diminish worker performance. Stroboscopic effects of lighting (fluorescent) can be particularly hazardous, whereby moving machinery appears to be stationary under fluorescent lighting.

High levels of noise have been proven to affect performance. In one piece of research, male volunteers when exposed to about 80db of noise over successive half hours, could not keep a check on how far they had progressed, when carrying out repetitive tasks. Research has also found that noise affects cognitive and vigilance tasks. One study showed that loud industrial noise exposure significantly increased the duration of reaction and movement times during simple vigilant tasks.

Inadequate temperature and humidity control can cause discomfort (sweating) that may affect grip, illness through heat stress or cold stress, and cramps. High levels of humidity can affect the body's regulatory system by reducing the evaporation of sweat from the skin.

### The Effects of Under-Stimulation, Fatigue, and Stress on Human Reliability

#### Under-Stimulation

According to ehow.com "Under-stimulation refers to the feelings of stagnation, boredom, and lack of inspiration that result from not feeling challenged in a given situation. Under-stimulation may be primarily physical or mental in nature, but generally refers to intellectual boredom.

*Causes of under-stimulation can include either a flawed outlook held by an individual, outer circumstances, or a combination of the two. It can be temporary or persisting. Common synonyms related to under-stimulation are boredom, monotony, tedium, and dullness".*

As individuals, we are all different. Some of us like jobs that are mentally challenging, require creativity and innovation, others prefer consistency and repetition, doing the same things every day (for example, data entry or production line work). If the person is not matched to the correct job, then there is potential for error. In one case,

the job is too challenging, leading to stress and errors. In the other case, the job is too monotonous, leading to errors due to a lack of concentration and boredom. It is the responsibility of management, through proper selection processes, to ensure that the worker and the job/task are a good fit. It is also possible for managers to vary the type of work given to operators. For example, a driver may be given different routes to drive, which will provide much needed variety. If a driver always drives the same route, then there is the danger of boredom and losing concentration.

## **Fatigue**

According to the HSE "Fatigue refers to the issues that arise from excessive working time or poorly designed shift patterns. It is generally considered to be a decline in mental and/or physical performance that results from prolonged exertion, sleep loss, and/or disruption of the internal clock. It is also related to workload, in that workers are more easily fatigued if their work is machine-paced, complex, or monotonous".

Fatigue results in slower reactions, reduced ability to process information, memory lapses, absent-mindedness, decreased awareness, lack of attention, underestimation of risk, and reduced coordination. Fatigue can lead to errors and accidents, ill-health and injury, and reduced productivity. It is often a root cause of major accidents (for example, Herald of Free Enterprise, Chernobyl, Texas City, Clapham Junction, and Exxon Valdez).

Key principles with fatigue:

- Fatigue needs to be managed like any other hazard.
- It is important not to underestimate the risks of fatigue. For example, the incidence of accidents and injuries has been found to be higher on night shifts, after a succession of shifts, when shifts are long and when there are inadequate breaks.
- Changes to working hours should be risk assessed. Most organisations fail to consider the safety implications of shift changes.
- Employees should be consulted on working hours and shift patterns. However, some employees may prefer certain shift patterns even though they are unhealthy and likely to cause fatigue.
- Develop a policy that specifically addresses and sets limits on working hours, overtime, and shift-swapping, and which guards against fatigue.
  - Operators should always get sufficient recovery time after a shift. It should not be permitted to swap shifts with a colleague resulting in working a double shift or excessive work hours without rest or sleep.
- Problems with overtime and shift-swapping may indicate inadequate resource allocation and staffing levels.
- Sleep disturbances can lead to a 'sleep debt' and fatigue.
- There are several key risk factors in shift schedule design, which must be considered when assessing and managing the risks of shift work. These are the workload, the work activity, shift timing and duration, direction of rotation, and the number and length of breaks during and between shifts.
- The organisation can introduce pre-employment medical screening and regular health checks to determine if operators are suffering from fatigue or have any sleep disturbance issues, such as insomnia.
- The working environment, such as the cab or control room, should be of a suitable temperature, humidity, and lighting to decrease the effects of fatigue. Lighting should help keep the operator awake, along with cool fresh air".

## Stress

*"Well-designed, organised and managed work is good for us but when insufficient attention to job design, work organisation, and management has taken place, it can result in Work related stress" (HSE).*

We will discuss the health aspects of stress in Unit ID2 9.2. For now, let us consider the impact on human reliability.

The positive side of stress is that it can kick-start your adrenalin and motivate you to perform your tasks more quickly in response to impending deadlines.

An overwhelming workload, lack of peer support, and too many demands at once can contribute to a sense of frustration and panic that there isn't enough time to complete the work. The lack of time means operators will not have enough time to consider the information they receive, and to form an intelligent decision. A stressed operator is increasingly likely to make mistakes and incorrect decisions.

## **The effects of personal attitudes (including risk perception), skills, habits and personality on task demands**

People bring several characteristics to the workplace. They have a variety of personalities, values, and attitudes. When they enter into organisations, these characteristics will determine how they behave and perform their tasks. Indeed, organisations recruit people with the expectation that they have certain knowledge, skills, abilities, personalities, and values.

Individual characteristics influence behaviour in complex and significant ways. Their effects on task performance may be negative and may not always be mitigated by job design.

Some characteristics such as personality are fixed and cannot be changed. Others, such as skills and attitudes, may be changed or enhanced.

Examples of individual factors leading to error include:

- Low skill and competence levels
- Tired staff (possibly due to shift patterns)
- Bored or disheartened staff
- Individual medical problems
- Age

Attitude is a difficult concept to define or quantify. It may be regarded as:

"The way the person believes they will respond in a given situation" (as opposed to the way they actually respond which may be quite different)

Individual attitudes are formed by many factors, including inherited personality traits, anxieties, experiences, expectations, and behaviour learned from others. Although some of these factors are outside the control of an organisation once an individual has been recruited, the culture of the organisation itself has a profound influence upon attitudes. Attitudes can be changed for the better or worse. It is usually easier to change behaviour rather than attitudes. A change in behaviour, however, may bring about an attitude change.

Perception may be defined as:

"The way that people interpret and make sense of presented information".

People tend to have mistaken and unfounded perceptions of risk. These are often based on an individual's own limited experience. People learn by experience, their perceptions, beliefs, attitudes, and behaviour are shaped by it. It is in the nature of risk that unsafe behaviour does not always lead to injury. This creates the view that "If I have survived this long, I will continue to survive" or "I have always got away with it before". Thus, experience reinforces the unsafe behaviour.

Raising people's perception of the risks forms an important part of safety training.

People perceive risk through their normal sensory inputs of sight, hearing, touch taste and smell, with the main sensory input being sight.

Perception, to a large extent, relies on learning and experience. Generally, no two people perceive risk in the same way.

## **Organisational factors**

### **The effects of organisational factors on health and safety culture (including leadership and commitment at all levels)**

Good leadership in occupational safety and health and, consequently, good occupational health and safety standards within a company help differentiate the best performing organisations from the rest. Companies showing excellent leadership commitment can often show they have safer and healthier working conditions with workers who are confident and competent in their work, effective policies and followed by all staff, and by individuals and teams recognised and rewarded for their success. Such healthy cultures, fully supported by the management on all levels, lead to a continuous safety and financial improvement.

### **Organisational factors that affect human reliability: patterns of employment, payment systems, shift work**

#### **Patterns of Employment**

The hours and times that people work have a significant impact on their human performance. Shift patterns, shift rotations, and the lengths of shifts, can all vary between organisations. Some patterns of employment have a greater potential for fatigue and human error.

Night shift workers are particularly vulnerable. Those on permanent nights often get less sleep than those who work days. They sleep less during the day because sunlight may enter the bedroom and disrupt their sleep. During the night shift, there is usually a point where workers are less attentive and more accident prone. Usually around 3am, but this can vary.

Permanent day workers are not immune to fatigue. Statistics show that sometimes of day have more accidents than others. There are greater numbers of accidents in the first two hours of shifts, possibly due to workers still being fatigued in the morning. Accidents then decrease as they approach lunchtime. There is another peak of accidents in the afternoon after lunch, possibly because of workers feeling sleepy during food digestion.

Shifts can vary in length, and the longer the shift the more likely workers will get tired. Some people only work part-time, and their shift could be limited to 2 to 4 hours. For full-time workers, 8 hours is considered normal, but many work up to 12 hours. In the fire and rescue services (e.g. fire-fighters), 24-hour shifts are quite common.

Workers should be provided with sufficient breaks during the shift. In the EU, the legal minimum is a 20-minute break if the shift lasts for more than 5 hours. The break must be taken during the shift, not at the beginning or end. Whilst this is a legal minimum most organisations will provide more.

The breaks must be spaced out reasonably evenly or timed to give workers rest after very intense physical or mental tasks. The purpose of the rest is to give the body time to recover strength, re-oxygenate the muscles, and for the brain to relax. Breaks also provide a social function, where workers can meet informally and talk if they wish to. The social aspect is important since socialising can help with mental relaxation.

Other differences in patterns of employment include:

- Temporary workers versus permanent workers.
- Flexible workers versus working at a fixed time or location.
- Day versus night.
- Part-time versus full-time.

The HSE states that "the health and safety implications of the increased adoption of flexible work and employment patterns are wide ranging. For example:

- Part-time and temporary workers may not always receive equal training opportunities or health and safety protection, compared to full-time or permanent employees.
- Precarious forms of employment may generate feelings of job insecurity and stress, because of isolation or conflicting demands arising from the blurred distinction between work and home life. Higher levels of job insecurity typically experienced by temporary workers can result in impaired wellbeing, and less desirable attitudes and behaviours towards work.
- Temporary workers are likely to be at increased risk of injury, as the risk of workplace injury is increased during the first 4 months within a new job.
- Although part-time workers spend less time at work, their injury rate per hour worked is higher than those working full-time.
- Due to the increasing numbers of workers engaged in shift work, it is important not only to monitor and minimise known risks (e.g. those relating to disruption of circadian rhythm), but also to respond to any new evidence identifying associations between shift work and ill health".

## **Payment Systems**

Costs will be associated with any payment scheme and organisations should accept this no matter what system is used to pay the workers. It will involve critical resources such as:

- Management and staff time.
- Expert help or training to set up and run.
- Actual pay costs (money to pay workers and any additional taxes legally required).

A systematic approach to setting up and running a pay system is essential and will create a system that runs smoothly. It is much better for all concerned than trying to save costs and set up a system that is constantly running into difficulty. Careful planning, and involvement of workers will help to avoid difficulties, inaccuracies in pay and resentment among the workforce.



Most people work so that they can earn money. However, this is not the only reason that people go to work each day. Therefore, consideration should extend to the work environment and other methods of incentive in the work environment other than just relying on a monetary payment scheme.

All pay schemes need to encompass the following:

- Legal requirements regarding minimum pay standards.
- Measures implemented to assess performance.
- Setting standards for each job role.
- How and when the system would be reviewed.
- Responsibilities for assessment clearly set out and allocated.
- Ensuring that there is no element of discrimination or bias.

There are different types of model available for structuring pay:

- Broad banding - set levels or tiers of the hierarchy are graded with a structured pay grades on each hierarchy. Each job needs to be assessed on the basis of the competence, knowledge and skills of the role.
- Skills based - where pay bands are set but the individual is matched to a particular band rather than the job role.
- Competency-based system - based on the number of key traits a worker has in relation to the job specification.
- Performance based pay - where a worker will start on a basic pay grade and be rewarded for good work against set key performance indicators. Pay reviews on this method are usually annual.
- Manager set pay - where the manager assesses each individual and agrees a salary/pay rate for each worker. This has the potential for bias and can breed resentment if not handled correctly.
- Variable pay - often used in sales where a worker is given a basic low-end salary and then commission for completed sales on top of the salary. The sales will be assessed at set times.

With output-based incentives, such as the variable pay scheme, workers will be tempted to increase their speed, and take greater risks, thus increasing the possibility of injury. They can also have a negative impact on product quality since workers are more concerned with quantity of production rather than the quality of the product.

This type of pay scheme is not really suitable in a service-based industry, consequences can include poor customer service and stress for the worker as services are less definitive than a product outcome. Variables such as customer interaction and understanding can delay service enquiries or calls and as such a previously agreed quota of completion may not always be possible in a set timescale.

A variety of pay schemes may be used across the full organisation to reward workers in the most appropriate way. The methods and assessment levels need to be clearly set out and understood. For larger organisations, this is handled by a Human Resources department who report to the senior management team.

Benchmarking is a useful exercise to identify the current industry standard as well as the levels of pay offered by other companies whichever pay scheme is offered.

## Shift Work

Many organisations utilise shift work, especially in processing and manufacturing where equipment is run 24 hours a day. There is extensive guidance from the HSE on this topic that cover the actions that an organisation must take to adequately control the risks arising from shift work in addition to job-specific risks. Organisations should:

- Consider the risks of shift work.
- Establish systems to manage the risks identified.
- Assess individual hazards and risks associated with shift work.
- Inform workers of the risks and signs to look for.
- Take action to reduce the risks.
- Check and review arrangements regularly.

The typical effects of shift work on the worker are:

- Disruption of the body clock.
- Fatigue.
- Sleeping difficulties.
- Disturbed appetite and digestion.
- Reliance on sedatives and/or stimulants.
- Social and domestic problems.
- Adverse health effects.

One or a variety of these can present slowly over time and can negatively affect performance and increase the likelihood of errors and accidents at work. Some common presentation of these issues are:

- Vigilance and monitoring become less accurate and critical steps can easily be missed in processes.
- Decision making can become irrational where the worker chooses to work in a way that requires less input. This can involve cutting corners by not wearing PPE, not using the right equipment, or using the right equipment incorrectly.
- Awareness can become impaired, and workers are less able to spot errors, difficulties and other health and safety issues that would normally be apparent.
- Reaction times can get slower.
- Tracking ability becomes lessened where workers are less able to follow tasks in the right order or steps may be missed out.
- Memory becomes impaired meaning that training and other information may not be as effective.
- Health can be affected. The following ill-health issues are associated with long-term shift work:
  - Gastrointestinal problems
  - Cardiovascular problems
  - Fatigue
  - Increased susceptibility to minor illnesses indicating a decline in immune response

The effects of shift work are commonly linked to social and domestic problems. This can add stress to the worker, and this will also impact the health and abilities when in the workplace.

Taking into consideration the effects above, shift workers should be offered ongoing occupational health assessments to assess their physical and psychological fitness in addition to any legal requirements for specific risks associated with their job role.

The UK HSE guidance HSG256 "*Managing shift work*" provides further information and detail for employers and organisations with advice on shift work and its impact on health and safety.

## **The Effect of Weaknesses in the Health and Safety Management System on the Probability of Human Failure**

### **Inadequacies in the Setting of Standards**

Health and safety standards are standards designed to ensure the safety of products, activities, or processes. They may be defined by law or developed by an advisory body, such as the ILO. Legal standards must be followed. Organisations may choose to use a formal management system (such as ISO 45001:2018) and integrate health and safety with its other business functions, or adapt their own system based on codes, sector specific guidance or in-house company standards. Whatever approach is adopted, it should be systematic and sustained.

When standards are developed, they should specify:

- What they are for (such as a standard operating procedure, for a specific task).
- Who they are aimed at (such as operators, maintenance workers).
- What the safety requirements are (such as carrying out the task step by step, the need to wear certain PPE, etc.).

Poor or unworkable standards may lead to users ignoring them. As a result, standards could be unclear. One scenario is confusion around whether hearing protection should or should not be worn in certain areas. It may be a mandatory hearing protection zone, but if management do not enforce this with people just walking through, this could send a message to other workers that protection is not required if in this zone temporarily. The confusion can grow to the point where both workers and managers just ignore the standard.

Where possible standards should be common within an organisation. If wearing PPE for a task in one part of the organisation, there should be a common standard requiring PPE for the same task in other locations of the organisation. This common approach means that workers are clear as to what is expected of them. Inconsistency may frustrate and de-motivate workers, leading to a greater chance of an accident.

### **Policy**

The policy is the cornerstone of the management system. It lays down the organisation philosophy and commitment to health and safety, together with its aims and objectives.

The policy should be:

- Signed by top management to define its objectives.
- Be suitable to the organisation and its activities.
- Clearly constructed to show the statement of intent, organisational responsibilities, and arrangements.
- Be up to date and reviewed at least annually.
- Clear in defining responsibilities.

- Constructed to evenly distribute responsibility among the hierarchy in line with the competence of the job roles.
- Communicated to workers.

By ensuring all of this, it will demonstrate top level commitment and dedication to health and safety promoting a positive culture. Human failures occur less frequently in a positive safety culture.

If one or all of these points are not successfully implemented it can have the opposite effect and there is a danger that the health and safety culture becomes negative, leading to more human failures and possible incidents.

## **Planning**

Planning is the key to ensuring that health and safety arrangements really work. It helps organisations think about what systems they need to fulfil their commitments and achieve the objectives set out in the policy. They need to consider:

- Organisational aims i.e. what the organisation wants to achieve.
- Unsuitable objectives that are not "S.M.A.R.T."<sup>1</sup>.
- How to assess risks and suitable control measures.
- How improvements will be prioritised.
- How the responsibility for tasks will be assigned.
- Monitoring and measuring techniques and intervals.

If there are insufficient resources (capital, time, or personnel) to complete these processes, it is possible that some hazards and risks will be poorly controlled. If a risk assessment plan does exclude non-routine events such as breakdowns, it could lead to breakdown repairs being done unsafely. Alternatively, incorrect equipment may be used to complete tasks such as a ladder being used for work at height rather than a mobile scaffold.

## **Information Responsibilities**

Communication and information are critical in minimising health and safety risks in the workplace. As a bare minimum, workers should be given information on:

- The hazards and risks associated with their tasks.
- The control measures to be followed.
- Who to report to if control measures become defective.
- Where to go for advice in the event of a problem.
- What to do in the event of an emergency.

Information can be given verbally such as a simple instruction from a supervisor, or in written format such as a maintenance worker being given the manufacturer's instruction manual to follow for operating equipment.

Organisations should clearly identify the arrangements and responsibilities for passing on essential safety information to the workforce. This should form part of the management system. Information sharing is a responsibility of all employees from senior management down to newly appointed workers. The organisation needs to ensure that each person's responsibilities for information is clearly communicated through job specifications, policy, and written procedures.

A good example of failure resulting from insufficient information is the Piper Alpha disaster in 1988.

A critical piece of equipment information was not passed over by an outgoing shift to the incoming shift regarding a piece of equipment that was under repair. At the time of the shift handover, a relief valve had been removed from a pipe.

The incoming shift starting up a process unaware of the missing relief valve. The process resulted in gas being expelled from the capped pipe which started the chain of events that resulted in fire, explosion, and the deaths of 167 workers.

### **Monitoring**

In the words of management consultant Peter Drucker: "*you can't manage what you can't measure.*" It applies just as much in the field of occupational health and safety as it does to any other business parameter (such as business profit and loss, quality, or production targets).

When management systems have been implemented, it is crucial that occasional checks are done (such as inspections or audits, for example) to ensure that the system is working as designed. Failure to monitor, or follow up on the results of monitoring, can lead to breakdown in control measures, putting workers at greater risk.

Organisations also have a responsibility to supervise their workers. In some situations, supervision may be lacking. There may be sufficient supervision on a day shift, but no or few supervisors on a night shift. Weekends are another difficult time for supervision. If no supervisor or manager is present, there is the risk of workers ignoring basic safety rules and taking shortcuts to make their job easier.

Therefore, monitoring at all levels of the hierarchy is essential. Even senior management should undertake peer reviews and be receptive to ideas on how they can improve.

Appraisals and monitoring techniques should be regular, and action taken on any improvements required.

<sup>1</sup>S.M.A.R.T: Specific, Measurable, Achievable, Realistic, Timely.

### **The Influence of Formal and Informal Groups within an Organisation**

A group can be defined as several individuals who come together to accomplish a task or goal. For example, a football team is assembled to win a football match.

According to keydifferences.com "In an organisation, formation of groups is very natural, whether it is created by the management or by the members of the organisations themselves. The most common reason behind the creation of a group is the urge of people to talk and make their own circle, where they can interact freely, know each other, work together, and accomplish the tasks which are being assigned to them. Groups are basically divided into two categories. First one is the *formal* group, which are formed by the organisation, to complete a task. The other one is an *informal* group, formed by the workers as per their likes, interests, and attitudes".

#### **Formal Groups**

Formal groups are created (by management) in order to achieve a specific organisation objective or goal.

In general, workers in an organisation are divided into groups and tasks are allocated to the groups (sometimes referred to as "work groups"). The groups will usually have a hierarchy (chain of command) and defined roles and responsibilities. If each group accomplishes its tasks, then the organisational goals should be achieved.

In terms of health and safety, safety committees can be considered as formal groups.

Inevitably, in some groups competition will exist, where some members of the groups will try to outperform others. Conversely some group members may not work as hard as they should. This can potentially cause conflict within a group and can impact on performance.

In terms of group leadership, the behaviour of the leader can have a direct bearing on the group and individuals' behaviour and attitude towards health and safety.

Ideally formal groups can be used to communicate effectively to workers from management and vice versa. They can be utilised as a method of communication both ways and if structured properly can be a positive resource for the organisation.

### **Informal Groups**

Informal groups are defined as "a group formed by workers (or managers) of an organisation that is created under no directive from management but simply because group members have a shared common interest". The group may focus on issues that run counter to organisational norms or may exist to improve functions of the workplace or morale.

*In some workplaces, the relationship between management and workers is strained, causing difficulties, and affecting productivity. An informal work group gives workers an opportunity to gather in a safe environment where concerns about management can be discussed openly with little fear of repercussion. When presented with suggestions and plans from this group, management may pay more attention, knowing that the outcome was reached with the input of workers who felt strongly enough to be motivated to form the group and design a plan. At one extreme, if relations are bad enough, an informal working group on this subject may be the precursor to forming a union".*

Informal groups can exert a positive or negative influence on the organisation. The group may be guided by one or two individuals with strong personalities. If the group is negative towards the organisation and its goals, there may be a tendency to break rules, including health and safety rules, and act contrary to what they perceive management to want. The group can create inertia in the organisation, perhaps stopping it from introducing new management health and safety initiatives. A group led by one charismatic, change-resistant, influence wielding individual can stop most health and safety initiatives in their tracks. This individual will need to be dealt with before change can take place.

Informal groups can exert a powerful influence on an organisation's health and safety culture, which in turn may lead to poor standards of health and safety performance.

In some cases, though, an informal group may help to promote issues or problems that have been previously fed back to management through the appropriate channels but have not been addressed.

### **Organisational Communication Mechanisms and their Impact on Human Failure Probability**

Communication allows people, tasks, processes, and systems to interact purposively and co-operatively to achieve health and safety objectives.

Angelica M. Vecchio-Sadus in her Safety Science Monitor article 'Enhancing safety culture through effective communication' stated "the way we communicate about safety will influence whether or not people will understand and participate in the safety process, and the language we use will often determine whether the process is accepted or rejected. Merely training people to work safely will often not be sufficient.

The process of safety communication is like traffic on a road. You need to plan the route to your destination, respond to signals and signs, take a different route if your path is blocked, modify your approach according to the conditions (such as motivation, culture, status), and slow down when required. The information provided should be communicated appropriately, considering of workers' levels of competence and how you anticipate they will receive the message".

### **Shift Handover Communication**

The UK HSE have stated that *"Effective communication is important in all organisations when a task and its associated responsibilities are handed over to another person or work team. This can occur at shift changeover, between shift and day workers, or between different functions of an organisation within a shift e.g. operations and maintenance."*

The goal of handover is the accurate reliable communication of task-relevant information across shift changes or between teams, thereby ensuring continuity of safe and effective working. Effective handover consists of three elements:

- A period of preparation by out-going personnel.
- Handover where out-going and in-coming personnel communicate to exchange task-relevant information.
- Cross-checking of information by in-coming personnel as they assume responsibility for the task.

Many accidents have occurred because of failure of communication at shift handover, most of these involved planned maintenance work.

In the 1983 Sellafield Beach Incident, highly radioactive waste was accidentally discharged to the sea, due to a failure of communication between shifts.

The Cullen Report concluded that one of the many factors that contributed to the Piper Alpha disaster was failure of information transmission at shift handover.

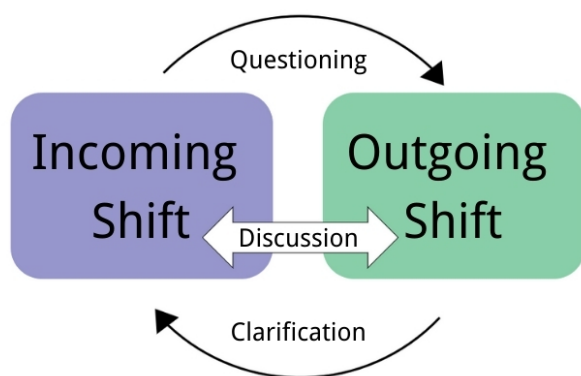
Shift handovers should be:

- Conducted face-to-face.
- Two-way, with both participants taking joint responsibility.
- Done using both verbal and written communication (i.e. with the support of logbooks, visual displays, records, etc. whilst discussing these together).
- Based on an analysis of the information needs of incoming staff. For example, the incoming shift may have been off for several days and may be completely unaware of problems occurring the past few days. Also, they may be relatively inexperienced, and need extra explanation.
- Given as much time and resource, as necessary. It is too common for one shift to end at the same time as the next shift begins. There must be some shared time, so the outgoing shift is not hurrying to leave work.

To ensure safe handover, the UK HSE recommend that organisations should:

- Identify higher risk handovers.
- Develop staff's communication skills.
- Emphasise the importance of shift handover.
- Provide procedures for shift handover.
- Plan for maintenance work to be completed within one shift if possible.



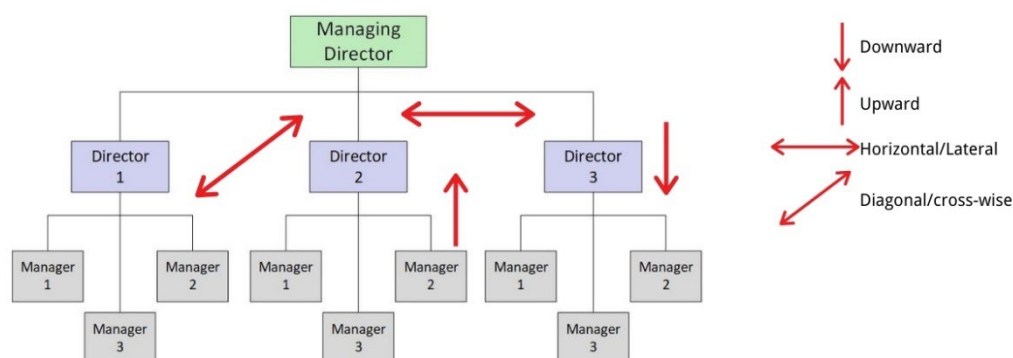


### *Shift handover communication*

## **Organisational communication routes and their complexity, reliability, and degree of formality**

### **Organisational Routes of Communication**

In an organisation, communication flows in 4 main directions, *Downward*, *Upward*, *Laterally*, and *Diagonally*



### *Directions of communication*

### **Downward Flow of Communication**

Communication that flows from a higher level in an organisation to a lower level is a downward communication. Downward communication flow relates to the hierarchy of the organisation. As the messages travel down through the levels, it appears to become larger; a simple message from the top and become formal plans at the lower level.

Workers require this information for performing their jobs and for meeting the expectations of their managers.

Downward communication can be used for the following purposes:

- Providing feedback on workers, and business, performance.
- Giving job instructions.
- Providing a complete understanding of the worker's job as well as to communicate to them how their job is related to other jobs in the organisation.
- Communicating the organisation's strategic vision to the workers.

Organisational publications, circulars, letter to workers, group meetings are all examples of downward communication. Health and safety information might include learning from accident information, update on health and safety performance to date, and results of risk assessment reviews.

To have effective, error-free downward communication, managers must:

- Have a clear understanding of what they hope to achieve by communicating the information. The information should be tailored and presented in such a way as to help achieve the goal. If the communication is about encouraging people to report near misses, then it would be helpful to explain why reporting near misses is important and how it can benefit the workers.
- Ensure that the message is correct, precise, and clear.
- Use the best technique to communicate the message.

### **Upward Flow of Communication**

Communication that flows to a higher level in an organisation is called upward communication. It provides feedback on how well the organisation is functioning. The subordinates use upward communication to convey their problems and performance to their superiors.

Upward communication can be used by the workers to show if they have understood the downward message. It can be used by safety committee meetings, where the views and the ideas of the workers are discussed and then communicated upwards to those with authority to make decisions. This enables the workers to raise any concerns they may have which in turn creates a committed and loyal workforce with a good culture. Managers and others further up the communication hierarchy are then able to act to rectify the issues.

Grievance procedures, Complaint and Suggestion Boxes, Job Satisfaction surveys, etc. all help in improving upward communication. Other examples of Upward Communication are:

- Performance reports made by low level management for reviewing by higher level management.
- Worker attitude surveys.
- Letters from workers.
- Worker-manager discussions.
- Worker committees and forums.
- Incident reporting.
- Feedback on toolbox talks.
- Health and safety representative inspection findings.

The feedback that management receives from lower level is, thus, extremely important and it should be encouraged. It should, however, be remembered that if the right climate is not created, workers may not provide their feedback freely and accurately.

### **Lateral Communication**

Communication that takes place at same levels of hierarchy in an organisation is called lateral communication, i.e. communication between peers, between managers at same levels or between any horizontally equivalent organisational members. The advantages of horizontal communication are:

- It is time saving.
- It enables the task to be co-ordinated, especially useful if two or more departments are involved.
- It facilitates cooperation amongst team members. For example, there may be a need to discuss a task that will affect both departments before issuing the PTW.
- It is a means for the sharing of information between departments.

- It can be used for resolving conflicts between different departments or within departments.

Such communication often takes place by means of telephone calls, short memos and notes, email or face-to-face interactions.

This type of communication takes place informally in all organisations. It could be employees discussing work related matters such as line managers or working conditions or personal problems that are non-work related.

### Diagonal Communication

Diagonal communication is between a manager and the workers of other groups within the organisation. For example, when designing a training course, the trainer manager may interact with workers to discuss how the task is performed so that this can be included in the training.

### Reliability of communication

Common problems with organisational communication include:

- **Not all workers are being informed:** people may miss emails or be absent when talks are undertaken.
- **Workers not receiving consistent messages from management:** different supervisors are sending different, sometimes conflicting, messages about priorities. This causes confusion and distrust among workers.
- **Workers not receiving timely messages:** Information is not getting to workers when and where they need it. Without vital information at the right time and in the right place, the decision-making process slows, and projects are not completed on time or in the best or safest way.
- **The right information is not being sent to the right people:** For example, key engineering personnel do not get information about an equipment-related safety issue that occurred elsewhere in the organisation.
- **Information overload:** for example, a health and safety magazine is circulated for all supervisors and managers to read in case there is anything of interest to them. Another example is email overload, where information emails are sent to large groups of people but is only relevant to a small portion of the recipients. This can dramatically increase the number of emails received in a day, resulting in important emails being missed or forgotten.
- **Communication Hindered by Distance:** Groups that are a distance away from each other could communicate less than those in close vicinity. Greater distances mean more time and effort is required to arrange face to face meetings.
- **Lack of communication at regular intervals:** This is often an issue with project management and can present issues when work is delayed due to lack of communication.
- **The wrong medium used for communication:** The communication method should be appropriate to the surrounding. It is not effective to use verbal instruction when in a noisy area as critical information may be missed.
- **The verbal communication passes through several layers:** Information becomes distorted the more people are involved in the chain of communication and the message can be different when it is received than it was when it was first communicated.

Possible resolutions include but are not restricted to:

- Ensure that there is a process to communicate any messages or information that has been missed while the employee has been away or absent. A "back to work" meeting for all absences would address this issue.

- Priorities need to be clear and effectively communicated to Supervisors (preferably in writing) to ensure that the same message is circulated across the organisation.
- Regular standardisation meetings should be held for any projects where there are multiple teams.
- Managers and Supervisors need to be responsible and held accountable for communicating instructions and other information in a timely manner. This will ensure a manageable workflow for workers.
- Managers and Supervisors need to make sure that relevant information is sent to all those involved. Sometimes this will require "information only" messages to advise all teams or workers involved of other work that is being undertaken.
- Communication via email should be kept to the bare necessity and spam filters applied so that unnecessary messages are filtered out. Spam folders should be checked weekly to ensure relevant information is not accidentally removed from the main feed.
- Where possible, travelling should be minimised in order to avoid risks associated with travelling to meetings. Meetings can be arranged using web technology which can save time, money, and avoidable risk.
- If there needs to be regular communication between workers and their superiors, it needs to be regular and timely so that everyone is aware of any developments. Regular scheduled updates need to be adhered to with managers and supervisors ensuring that the update deadlines are met.
- Communication needs to be in the correct format for the receiver. Managers and Senior Managers often require reports that are formal and include a short outline of major points at the start of the report. However, this style of communication is not relevant for workers who require instruction on how to use a piece of equipment. The format should be capable of passing on information in an understandable and user-friendly way.
- Important information should be in written form so that it can be clearly communicated through different layers of the organisational hierarchy without being distorted. Safety critical information should always be in written form so that it can be referred to several times and by different groups or individuals.

## Degree of formality

In general, communication in an organisation falls into one of two categories:

- Formal communications
- Informal communications

Key differences.com define both types as follows:

**Formal communication:** *The communication follows a hierarchical chain of command which is established by the organisation itself. This type of communication is used exclusively in the workplace, and the workers are bound to follow it while performing their duties. Examples include safety bulletins, safety committee minutes, instructions in shift logbook.*

**Informal communication:** *The communication which does not follow any pre-defined channel for the transmission of information is known as informal communication. This type of communication moves freely in all directions, and thus, it is very quick and rapid. In any organisation, this type of communication is very natural as people interact with each other about their professional life, personal life, and other matters. Examples include gossip, talk about supervisors, chat about a safety issue or accident.*

## Formality

The degree of formality of the different types of communication will vary depending on:

- Who is delivering the communication - if the communication is coming from Senior management, it is likely that it will be in a formal format and as this is disseminated to the relevant people at shop floor level, it is likely to become less formal and more precise.
- Who is receiving the communication - If communication is going from the worker up to senior management it will become more formal as it travels up the hierarchy. A worker could raise an issue verbally which is emailed from supervisor to a manager and then included in a formal report to senior members of the organisation.
- The format - Emails, letter or reports to external stakeholders and customers should be kept formal and to the point whereas a quick email to a colleague may be less formal.
- The nature of the information - Information that needs to be followed precisely would involve a list of instructions. This would differ from statistics that are circulated for quick reference which may be depicted in charts or pictographs. Formal instructions should also be easily located in the area required and easily accessible to all who need to follow them.
- The urgency of the information - If a task is being performed in an unsafe manner, it would not be appropriate to go away and produce a report as to how the process should be improved. Verbal communication would be required and then this can be followed up with written communication to all workers that complete the same task and inclusion in reports to managers at a later date.
- The retention requirements for the information - If information needs keeping for a set period of time e.g. insurance certificates, then there needs to be a suitable storage area where this formal information is kept. Communication relating to day-to-day tasks may only require retention for the duration of the task and would therefore not require much formality.

It is always important to be polite and demonstrate respect and be professional in any form of communication with any person in the work environment. Organisations need a code of conduct for all staff to comply with and this should be regularly communicated to all workers across the organisation to prevent workers falling into bad habits that can undermine moral and positive health and safety culture.

## Contribution of Human Failure to Serious Incidents

### Seveso

On Saturday 10th July 1976, a bursting disc on a chemical reactor ruptured in a small chemical manufacturing plant in Milan, Italy. It was reported that maintenance staff had heard a whistling sound at the time the disc ruptured. The vapour cloud was seen to be expelled by a roof vent and the dense white cloud drifted offsite towards the town of Seveso, located 15 miles away. Among the substances in the white cloud was a small deposit of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin ('TCDD' or 'dioxin'), a highly toxic material.

The town of Seveso had 17,000 inhabitants and although there were no human fatalities, thousands of animals died and many more were slaughtered to prevent the toxic chemical TCDD from entering the food chain. Due to the risk of foetal malformation to those pregnant women exposed, many chose to abort their pregnancy.

The release lasted for some twenty minutes. Over the next few days following the release, there was much confusion due to the lack of communication between the company and the authorities in dealing with this type of situation.

Human contributions to the disaster included:

- The production cycle was interrupted, without any agitation or cooling, prolonging holding of the reaction mass as per the required process.
- In the final batch before the incident, critical procedures were misunderstood and performed in reverse.
- The bursting disc was set to withstand 3.5 bar pressure in the compressed air used to transfer the materials to the reactor. Had a bursting disc with a lower set pressure been installed, venting would have occurred at a lower and less hazardous temperature.
- There was a failure in design processes and subsequent risk assessments to identify that there was no device to collect or destroy the vented toxic materials before being released into the atmosphere.

Following this incident, The Seveso Directive was introduced by the EU to deal with the control of major hazards (onshore) that involve dangerous substances. The current Directive is known as Seveso III and in the UK, the COMAH regulations 2015 are used to implement this directive.

This is just one example of how human error has contributed to a disaster. There are many other examples of serious accidents, together with human contributions and other causes that we advise you research as background knowledge for your studies. Look at the details of the incidents and make a list of human errors that could have contributed. Whilst NEBOSH will not set exam questions about these named scenarios, questions have been set on scenarios that are similar. A knowledge of the consequences, contributing factors and events will help you prepare for these questions. A good way of researching these would be to identify factual reports and videos available.

1. Three Mile Island, nuclear accident - 1979
2. King's Cross Fire, underground fire - 1987
3. Clapham Junction, train crash - 1988
4. Herald of Free Enterprise, ferry accident - 1987
5. Union Carbide, Bhopal, chemical leak - 1984
6. Space Shuttle Challenger, lift-off explosion - 1986
7. Piper Alpha, oil rig explosion - 1988
8. Chernobyl, nuclear accident - 1986
9. Texaco Refiner, explosion - 1994
10. Deep Water Horizon, oil rig explosion and oil leak - 2010

## **Improving human reliability**

### **Initiatives for improving individual human reliability in the workplace:**

#### **Motivation and Reinforcement**

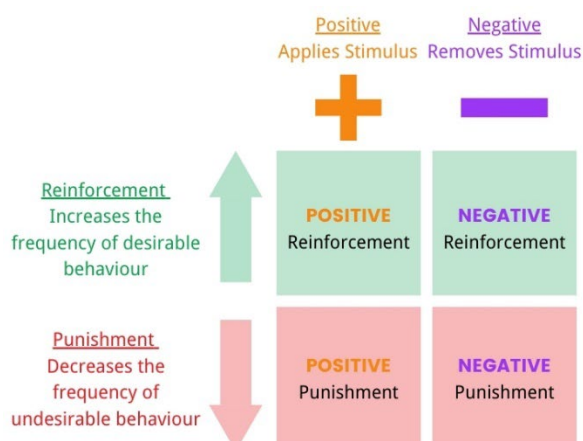
The reinforcement theory of motivation is based around the principle of the "law of effect". This law states that if good behaviour is reinforced with positive consequences, it will be repeated but bad behaviour will not reoccur if the consequences received are negative.

The following methods can be used by managers to modify workers behaviour:

- Positive reinforcement: whereby correct behaviour is rewarded with positive responses, to increase the likelihood that the good behaviour will reoccur. To ensure greater underpinning of the desired behaviour, the reward giving must be spontaneous.

- Negative reinforcement: implies rewarding a worker by removing negative or undesirable consequences to strengthen behaviour. For example, a worker has been burned removing hot products from a kiln. Heat protective gloves are then provided. To avoid the negative consequences of being burned, the worker then uses the gloves. Since the gloves mean the worker no longer gets burned, they are always now worn.
- Punishment works by applying negative consequences for negative behaviour to reduce the chance of the negative behaviour reoccurring. An example of this would be suspending a worker for breaking the company safety rules.
- Extinction reduces unwanted behaviour, like the punishment method but aims to discontinue a learned behaviour by withholding a positive consequence. Over time the lack of positive consequences will result in that behaviour ceasing. An example of this can be seen in the Pavlov's dog experiment. The dog was trained to salivate when a bell sounded. However, when the bell sounded repeatedly but no food was provided, the dog eventually stopped salivating at the sound. The behaviour was unlearned.

Whilst ignoring the feelings and drivers of individual behaviour, reinforcement theory explains in very simple terms how an individual learns behaviour. Managers who attempt to motivate workers must ensure that they do not reward all workers simultaneously. They must tell the workers what they are not doing correctly and clarify how they can obtain positive reinforcement.



### Reinforcement theory

### Workplace Incentive Schemes

According to the HSE "Incentives and rewards for employees and workers are just one of the ways in which you can encourage good health and safety behaviour and performance in the workplace." This can be done by providing rewards which are attractive (and desirable) to the workers involved in the scheme.

Incentives and rewards can be useful to:

- Encourage people to follow health and safety procedures.
- Reward those who achieve outstanding health and safety performance.
- Reward those who actively support a good culture on site.
- Encourage participation in safety initiatives such as surveys.
- Encourage, reward, and reinforce specific safe behaviours.



Rewards can include:

- One-off prizes, for individuals, or for a group.
- Monthly gift vouchers, such as a monthly scheme where those receiving reward vouchers for observed safe behaviours have their names entered into a prize draw to receive a cash prize or gift voucher.
- 'There and then' rewards that involve a single observed safe act resulting in a small reward, e.g. voucher schemes such as breakfast vouchers.
- Monetary accumulations when hitting a safety target (such as 100% of all safety action) which is donated to charity.

Rewards schemes are aimed at improving workers' attitudes and behaviours and, in doing so, improve their reliability".

### **Job Satisfaction and Appraisal Schemes**

Edwin A. Locke, in his process theory of motivation, suggested a goal setting approach to motivation. This established four main principles:

- Set people challenging goals, but not excessively challenging. If a goal is too challenging, they won't even try to achieve it. However, it should be challenging enough to give them a sense of achievement if they do manage to get there.
- Be specific in setting goals, not vague. People are motivated when they know exactly what is expected of them.
- Workers will be more motivated if they have some involvement in setting their own goals. If management impose goals on the workers, they at least need to fully explain and justify those goals.
- Having knowledge of the results of our work is desirable. For example, it is very motivating to be able to see the finished product and say, "I did that". If there is nothing to observe, then at the very least some feedback is needed from the manager on whether our performance was satisfactory or not.

These principles link closely with appraisal schemes. These are common practice in most large organisations. An appraisal is a formal method of worker assessment and development. In an appraisal system, the worker and manager set annual goals and objectives together. They review performance on a regular basis and check how the worker is progressing against these goals, and other key criteria such as behaviours and quality of work. At the end of the year, an annual appraisal meeting is held for a final review of performance. The outcome of this meeting often has a direct impact on the payment of financial bonuses or pay increases. New goals are agreed for the following year.

### **Selection of individuals – matching skills and aptitudes; training and competence assessment; fitness for work**

When recruiting it is important to consider three factors:

- Matching skills and aptitude to the tasks.
- Previous competence and training to do the task or arrangements needed to provide that training.
- Physical fitness and capability to complete the work required.

The UK HSE's guidance document HSG65 states that good organisations will have in place:

*"... Recruitment and placement procedures which ensure that employees (including managers) have the necessary physical and mental abilities to do their jobs or can acquire them through **training** and experience. This may require assessments of individual fitness by medical examination and tests of physical **fitness** or **aptitudes** and **abilities**..."*

### **Matching Skills and Aptitudes**

Organisations must have adequate procedures in place to ensure that the workers (and managers) they recruit have the necessary mental and physical abilities to do their job, and the required skills, aptitudes, experience, and training. If the individual lacks the necessary skills, then they must have the capability to acquire these in training.

The recruitment procedure will usually analyse the job to define what skills and attributes are necessary to fulfil the position. The procedure then needs to ensure that potential workers are vetted against these skills and attributes, and any gaps are identified before offering them employment.

To determine whether there are any gaps, organisations can use a variety of tools and techniques:

- Interview, to ask questions about previous experience and determine whether an individual understands how to do the job.
- Checking of qualifications and training records. However, these can be falsified so it can be worthwhile checking they are real with the organisation who awards them.
- Testing of ability. Tests can be written (mathematical or verbal reasoning) or practical (testing their ability to drive or carry out other tasks).
- Pre- or post-employment medical questionnaire or examination. This is also called a fitness for work assessment.

### **Training and Competence Assessment**

Many organisations will have a formal training and competence assessment process, whereby individuals must demonstrate competence to do the required tasks. If they are not competent, then the organisation must be prepared to provide the training. After the training, the individual is subject to an assessment, to check they have understood the training and are now competent to carry out the task.

As previously mentioned, training needs to focus as much on "Why" as "How". In other words, the training needs to explain the reasons for behaving safely and following the agreed control measures. The goal is to persuade the worker to cooperate, to help them understand the potential consequences to themselves (i.e. injury or ill-health) if they make a mistake or take a short cut. Hopefully, the training is clear and persuasive enough to secure their commitment first. From that point onwards, the training can then explain the correct manner of carrying out a task.

### **Fitness for Work**

A health assessment fitness for work is undertaken to ensure an individual is fit enough to undertake their work effectively without being a risk to the health and safety of themselves and/or others.

The purpose isn't to exclude people not capable of performing the task but to make modifications or adjustments to the task to ensure the individual is able to work not only efficiently, but safely.

Why an assessment may be needed:

- The individual's health condition may limit or prevent them from performing the job effectively (e.g. musculoskeletal conditions that limit ability).
- The individual's condition may be made worse by the job.
- The individual's condition may make certain jobs and work environments unsafe to them personally (e.g. liability to sudden unconsciousness in a hazardous situation, risk of damage to the remaining eye in an individual with monocular vision).
- The individual's condition may make it unsafe both for themselves and for others in some roles.
- The individual's condition may pose a risk to the community (e.g. infection transmitted by a food handler).

Assessment of medical fitness may be needed for those who are:

- Being recruited for the first time.
- Being considered for transfer to a new job.
- Returning to work after significant or prolonged illness or injury.
- Undergoing periodic review relating to specific requirements (e.g. health surveillance).
- Being reviewed for possible retirement on grounds of ill-health.

## Learning outcome 3

You will be able to assess, develop and maintain individual and organisational health and safety competence.

### 3.1: Competence, training, information, and supervision

Training is about teaching people different skills (or updating existing skills with periodic refresher training), or behaviour and is often targeted at a task. For example, teaching a warehouse operator how to drive a forklift truck. UK HSE guidance INDG 462 “Lift-truck training recommends 3 stages to the training:

- **Basic training:** Basic training should cover fully all the skills and knowledge needed to safely operate the type of lift truck and handling attachments (if any) the trainee will use, including awareness of the risks from lift-truck operation. It should take place ‘off the job’, without the pressures of production.
- **Specific job training:** This will normally follow the completion of basic training but may be combined or integrated with it. It will be tailored to an organisations particular needs and include, where appropriate:
  - knowledge and understanding of the operating principles and controls of the lift truck to be used, especially relating to handling attachments and loads specific to the job.
  - routine inspection and servicing of that truck, in accordance with the operator’s handbook or manufacturer’s instructions.
  - using the truck in conditions the operator will meet at work such as: loading bays; racking; automatic doors; confined areas; slopes; rough terrain.
  - instruction on site rules, such as site layout; one-way systems; speed limits; general emergency procedures; using protective clothing and devices including operator restraints.
  - training in the work to be carried out, such as loading particular types of vehicle with loads normally found at that workplace.
  - safe systems of work, which should include custody arrangements for keys.
- **Familiarisation training:** the third stage of training, which should be carried out on the job, under close supervision, by someone with appropriate knowledge. This could include:
  - applying, under normal working conditions, the skills already learned in basic and specific training, starting with simple tasks, and moving on to more complex ones.
  - becoming familiar with the lift-truck activities of the employer.
  - familiarisation with the site layout, local emergency procedures and any other feature of the work which it is not practicable to teach off the job.

It is far better to regard training as an ongoing feature of routine business activity. Training is unlikely to ever end in so far as almost every day people come into contact with situations which are different from those experienced so far. When this happens, more often than not they are able to make what might be called ‘running adjustments’ to their behaviour so that they can cope with the new scenario. In doing this they teach or train themselves; they adapt to new circumstances. However, there will be times when they should be given formal and structured training in order to deal with, for example, a new set of operating requirements since failure to do so could expose them to unacceptable risk. Situations where training may be required include:

- On recruitment (Induction)
- A change of job
- Process changes
- Introduction of new technology

- Introduction of new legislation
- Updated risk assessment or safe system of work
- After an accident
- Refresher training (workers' skills may decline over time)

## Groups with specific training needs

**Chief executives, Directors and Senior managers** require a complete understanding of their responsibilities under Health and Safety law. A typical training course might include:

- The reasons why we should manage Health and Safety.
- The principles of Health and Safety law
- Individual and collective legal responsibilities of Directors and Senior Executives
- The Health and Safety at Work etc. Act 1974
- The Corporate Manslaughter and Corporate Homicide Act 2007
- The principles and key elements of Health and Safety management systems
- The Health and Safety Executive and Institute of Directors guidance on Directors Duties – "Leading Health and Safety at Work"

**Managers or supervisors** need to know what you expect from them in terms of health and safety, and how they are expected to deliver. They need to understand the health and safety policy, where they fit in, and how the organisation wants health and safety managed. Supervisors may also need training in the specific hazards of processes and equipment operated by workers, and the control measures in place to control the risks. Training should be aimed at permitting supervisors to identify situations where there are unsafe deviations from the normal use of equipment (for example, a forklift truck driver driving the wrong way down a ramp) to take corrective action.

**Young persons** are particularly vulnerable to accidents as a result of their immaturity, inexperience, and, sometimes, youthful exuberance. Employers therefore need to pay particular attention to their needs. It is also important that new, inexperienced, or young employees are adequately supervised.

**Vulnerable adults** with special needs as a result of a physical or mental disability also need to be considered. Measures to ensure that vulnerable workers are not disadvantaged with regard to health and safety training might include:

- Altering the time or location of training.
- Providing course materials and information in a different medium.
- Providing a reader or interpreter.
- Providing individual, tailored training.
- Ensuring written materials are in simple language.

Training can have a big impact on the behaviour of people at work by informing them of hazards and risks in the workplace, together with control measures. Properly delivered, it can provide a powerful argument for workers to behave safely.

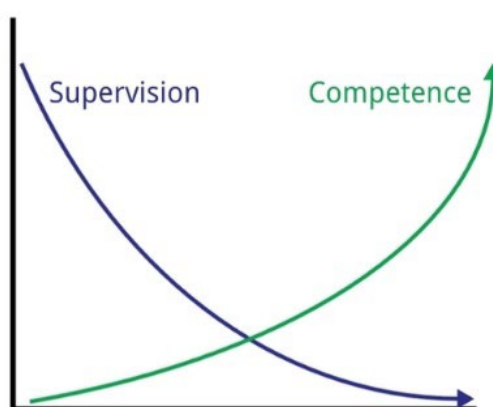
## Competency

Competency consists of several aspects of which training is only one. Other factors which help determine competency include skills, knowledge, experience, appreciation and understanding of the task at hand, together with an appreciation of when one's competency limits have been reached.

Training and / or qualifications alone will not necessarily mean that a person is competent. There are many situations where a person's theoretical knowledge will not be enough to carry themselves and their colleagues through tasks safely. It is experience that teaches us what works and what doesn't. Without that, the wrong decisions may be made or in some cases, no decision at all.

## The relationship between competence, external and self-supervision

The level of supervision required in a workplace depends on the nature of the work carried out, and the control measures used to control the risk. The riskier an activity and the less effective the control measure being used is, the higher the level of supervision the work task will require. Supervision does not mean the constant surveillance of workers' work activities - rather, it means general direction, coordination, and oversight.



The competence of the workers also determines the level of supervision required. For example, a young or new employee will require more supervision than an older more experienced employee.

## Specific training needs for certain hazardous types of work equipment

Operators of some types of work equipment require specific, focused training because of the inherent risks posed by the equipment to operators and those around them. Such equipment includes self-propelled; chain saws; woodworking machines; power presses and abrasive wheels.

### Self-propelled work equipment

Self-propelled mobile work equipment is work equipment which is propelled by its own motor or mechanism. The motor or mechanism may be powered by energy generated on the mobile work equipment itself, for example by an internal combustion engine, or through connection to a remote power source, such as an electric cable, electric induction, or hydraulic line.

There are numerous examples of self-propelled work equipment in the workplace, including forklift trucks; dumper trucks; excavators; mobile cranes and mobile elevated work platforms (MEWPs) but to name a few. Training requirements will vary, dependent on the equipment being operated. For example, a 1-day course (theory and practical) might be suitable for a MEWP operator, whereas a typical fork-lift truck course may take 4 days.

Chainsaws are potentially dangerous machines which can cause fatal or major injuries if not used correctly. It is essential that anyone who uses a chainsaw at work should have received adequate training and be competent in using a chainsaw for the type of work that they are required to do.



### **Rear-Handled Chainsaw**

Where training is being consolidated through workplace-based experience, the trainee should be supervised by a person competent in using a chainsaw for the work being done by the trainee. The supervisor should hold the relevant competence certificate or award.

Typical content of a chainsaw training course would include:

- Be able to identify, inspect key parts of the chain saw.
- Prepare the chain saw for work safely without risk to themselves, other people, or the environment.
- Carry out daily and routine maintenance on the chain saw.
- Operate the chainsaw safely and effectively and comfortably in accordance with the practical risk assessment.
- Using relevant personal protective equipment (such as head/eye protection; leg/groin protection; protective boots.).
- Identify the emergency procedures on a work site.

### **Woodworking machines**

All wood machining training schemes, including those as part of a joinery, furniture, and wood programme, should include the following elements:

*General skills:* General health and safety skills include an awareness of the health and safety risks and how to control them by:

- Extraction.
- The correct use of lifting aids.
- The correct use of protective equipment for eyes, ears, and hands.
- Keeping the workshop tidy.
- Sensible behaviour.
- Awareness of other operators.



**Machine-specific skills:** Operators need practical instruction in the safe operation of the machine, including:

- Its dangers and limitations during use, for example, the risks from taking off, dropping on and kickback.
- The main causes of accidents.
- Safe working practices including correct use of guards, jigs, and other protection devices (push-sticks, etc.), brakes, dust extraction and use of correct tooling.

**Familiarisation:** Involves on-the-job training under close supervision.

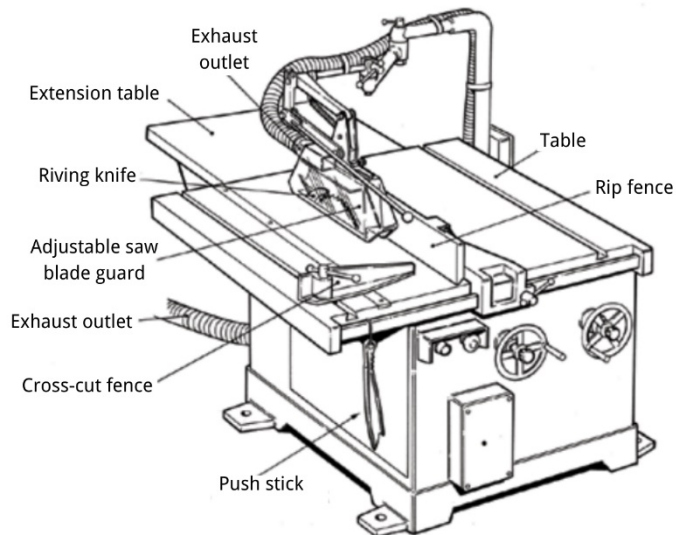


Image source - <https://www.hse.gov.uk/pubns/priced/l1114.pdf>

### **Bench mounted circular saw**

After the training has taken place the operator's competence should be assessed to see if the training has been successful. The assessor must be someone who knows the machining process, its risks and the safe working practices that should be used.

### **Power presses**

A power press is a machine that uses strong forces to bend, shape and mould components in a manufacturing environment. These forces are exceptionally strong and can present serious hazards to a machine operator. A power press injury can result in the amputation of fingers, hands, or arms and cause other disabling injuries. Proper safeguards, employee training, press maintenance, and inspections are vital to the prevention of injuries. For each type of power press and guard and/or protection device used, suitable and sufficient practical instruction in the following areas is needed:

- Power press mechanisms, particularly their safety aspects and including the nature and function of clutch mechanisms, flywheels, brakes, and ancillary equipment.
- Guards and protection devices - types and functions of each type of guard or protection device, including closed tools were used and method of installation.
- The causes and prevention of accidents involving power presses.
- The work of the tool setter - safe methods of working, lubrication, and co-operation with the press operator.
- Tool design in relation to safe systems of work.
- How to carry out an inspection and test of the guard protection device or closed tool, including how to detect defects.



**Power Presses**

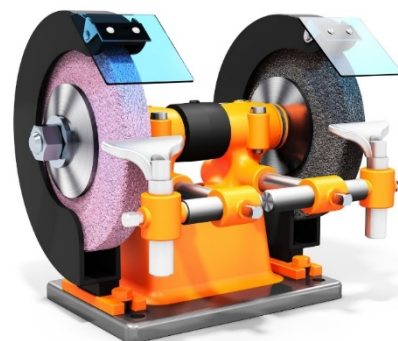
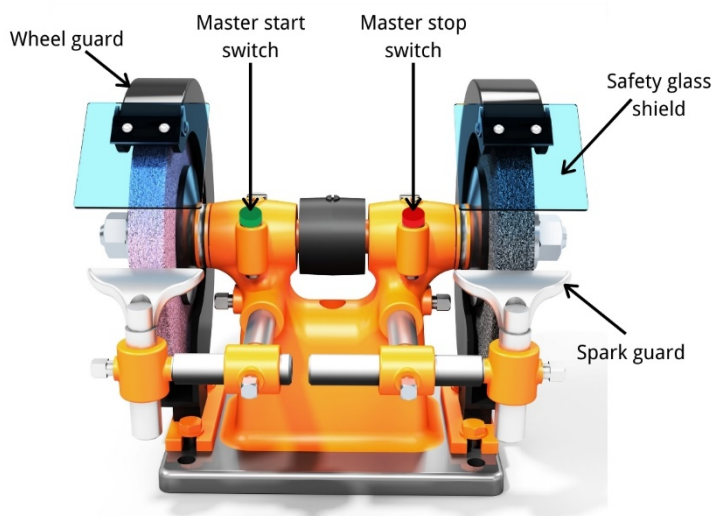
The training needed for a person appointed to inspect guards and protection devices can be undertaken at an external course and/or in the workplace. Wherever it takes place, it should include appropriate practical instruction on the topics listed. It is not possible to give precise guidance for the content of the training as this will depend on the duties involved in each case.

### **Abrasive wheels**

An abrasive wheel is usually defined as a wheel consisting of abrasive particles bonded together with various substances. There are two main types of bonding agent: inorganic and organic.

Inorganic bonds are mainly vitrified, i.e., the wheel is generally fired in a furnace to give the bond a hard, strong but brittle structure. These wheels are used for precision grinding applications as they hold their shape but require dressing.

Organic bonds are not fired but are cured at low temperature; the bond agents are resinoid, rubber and shellac. Such wheels are tough, shock-resistant, and self-dressing, and are most suited to non-precision applications, for example fettling and cutting off.



**Abrasive Wheel (pedestal grinder)**

The risk of breakage is inherent in every abrasive wheel. If the number of breakages is to be kept low, the initial care exercised in the design, manufacture and testing by abrasive wheel and machine makers must be coupled with the adoption of safety measures by the users. Accident statistics indicate that nearly half of all accidents involving abrasive wheels are due to an unsafe system of work or operator error.

There is no substitute for thorough practical training in all aspects of the mounting and use of abrasive wheels. Any training programme should cover at least the following:

- Hazards and risks arising from the use of abrasive wheels and the precautions to be observed.
- Methods of marking abrasive wheels with their type, size, and maximum operating speed.
- How to store handle and transport abrasive wheels.
- How to inspect and test abrasive wheels for damage.
- The functions of all the components used with abrasive wheels such as flanges, blotters, bushes, nuts, etc.
- How to assemble abrasive wheels correctly to make sure they are properly balanced and fit to use.
- The proper method of dressing an abrasive wheel (removing dulled abrasive or other material from the cutting surface and/or removing material to correct any uneven wear of the wheel).
- The correct adjustment of the work rest on pedestal or bench grinding machines.
- The use of suitable personal protective equipment, for example eye protection.

### Information required for the safe use and operation of work equipment

Employers should make available all relevant health and safety information and, where appropriate, written instructions on the use of work equipment to their workforce. Workers should have easy access to such information and instructions and be able to understand them.

Written instructions can include the information provided by manufacturers or suppliers of work equipment such as instruction sheets or manuals, instruction placards, warning labels and training manuals. It can also include in-house instructions and instructions from training courses.



### Instruction Manuals & Warning Labels

Any written instructions should be made available to the people directly using the work equipment. Employers should also ensure that instructions are made available to other appropriate people, for example maintenance instructions are made available or passed to the people involved in maintaining the work equipment.

Supervisors and managers also need access to the information and written instructions. The amount of detailed health and safety information they will need to have immediately available for day-to-day running of production lines will vary but it is important that they know what information is available and where it can be found.

Information can be made available in writing, or verbally where it is considered sufficient. It is your responsibility to decide what is appropriate, taking into consideration the individual circumstances. Where there are complicated or unusual circumstances, the information should be in writing. Other factors need to be taken into consideration, such as the degree of skill of the workers involved, their experience and training, the degree of supervision and the complexity and length of the particular job.

The information and written instructions should be easy to understand. They should be in clear English and/or other languages if appropriate for the people using them. They should be set out in logical order with illustrations where appropriate. Standard symbols should be used where appropriate.

Special consideration should be given to any employees with language difficulties or with disabilities which could make it difficult for them to receive or understand the information or instructions.

Any information and written instructions provided should cover:

- All health and safety aspects arising from the use of the work equipment.
- Any limitations on these uses.
- Any foreseeable difficulties that could arise.
- The methods to deal with them.
- Using any conclusions drawn from experience using the work equipment, employers should either record them or take steps to ensure that all appropriate members of the workforce are aware of them.

## 3.2: High Reliability Organisations (HRO)

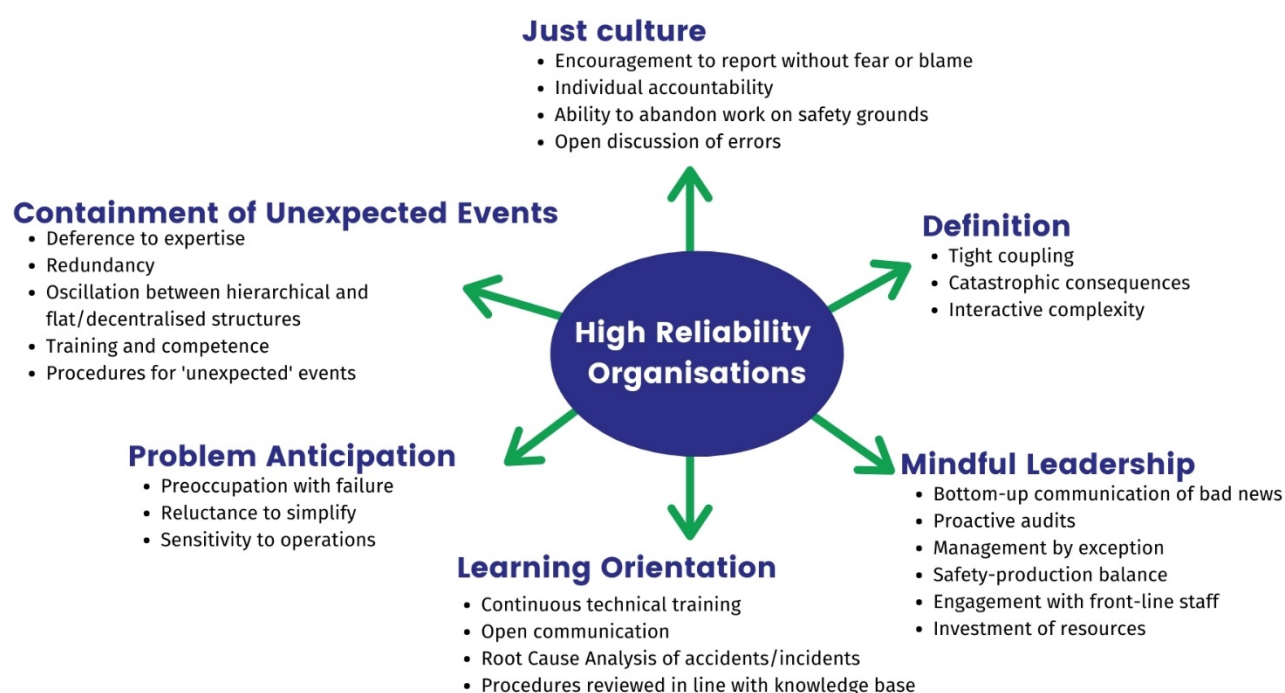
### What is an HRO?

An HRO may be defined as:

*“Organisations that are able to manage and sustain, for extended periods, error-free performance despite operating in complex, high hazard domains where the consequences of errors could be catastrophic”*

High reliability organisations nurture resilience by prioritising health and safety over other production pressures. An example could be that of a military aircraft carrier: despite significant (production) pressures, with hundreds of aircraft taking off and landing daily, in constantly changing conditions, all personnel have both the authority and the responsibility to make live operational adjustments to maintain safe operations as the top priority.

### Characteristics of an HRO



### Successful containment of unexpected events by:

- Having in place back-up systems in the event of failures and cross-checking of important decisions.
- Allowing people with expertise, irrespective of rank, to make important safety-related decisions in emergencies, whilst during routine operations there is a clear hierarchical structure and an understanding of who is responsible for what, investment in training and technical competence (*deference to expertise*)
- Well-defined procedures for all possible unexpected events.



### Effective anticipation of potential failures through:

- Engagement with front line staff in order to obtain ‘the bigger picture’ of operations (*sensitivity to operations*),
- Attentiveness to minor or what may appear as trivial signals that may indicate potential problem areas within the organisation and use incidents and near misses as indicators of a system’s ‘health’ (*preoccupation with failure*)
- Systematic collection and analysis of all warning signals, no matter how trivial they may appear to be, and avoid making assumptions regarding the nature of failures.
- Explanations regarding the causes of incidents tend to be systemic rather than focusing on individual, ‘blame the operator’ justifications (*reluctance to simplify*).

### Just culture characterised by:

- Open reporting systems for near misses and accidents without fear of punishment
- Follow-up of accident investigation outcomes by implementing corrective actions
- Empowering staff to abandon work on safety grounds
- Fostering a sense of personal accountability for safety

### Learning orientation characterised by:

- Continuous technical training
- Systematic analysis of incidents to identify their root causes and accident types or trends within the organisation
- Open communication of accident investigation outcomes
- Updating procedures in line with the organisational knowledge base

### Mindful leadership characterised by:

- Proactive commissions of audits to identify problems in the system (often in response to incidents that occur in other similar industries)
- ‘Bottom-up’ communication of ‘bad news’
- Engagement with front line staff through site visits
- Investment of resources in safety management and the ability to balance profits with safety.

### The lessons that other organisations can learn from HROs

Learning the hard way is no option for HROs. They operate in environments/areas where any mistake can have severe consequences. In addition, HROs are quick to adapt to changing circumstances and come up with innovative solutions to complex problems. Lessons that can be learnt from HROs include:

**Fostering pro-social motivation:** Pro-social individuals contribute to HROs recognise and raise problems at an early stage. Instead of putting their own interests first, they consider the interests of their team and the organisation as a whole. They see their responsibility as contributing to the positive development of the organisation. (Consider the motto of Dumas’s “the Three Musketeers” – “one for all, all for one”!)

**Encourage emotional ambivalence (uncertainty):** have you ever been in a situation where you have simultaneously experienced happiness and sadness or hope and fear? This is called is called “emotional ambivalence” and increases

the quality of decision making. Emotional ambivalent individuals avoid the comfort zone trap. They engage in a more balanced decision-making process. Emotional ambivalence is another contributor to mindful leadership and organising which is a key characteristic of HROs.

**Establish a psychologically safe environment and nurture communication:** In HROs, employees will raise concerns and share those concerns with other team members. This is termed “psychological safety”. When people feel safe in their work environment, they are not afraid to speak up and sharing their knowledge with others. This establishes a “psychologically safe work environment” and is critical when you want your organization to address risks and opportunities as early as possible.

**Develop a balanced organizational culture by increasing diversity:** There is plenty of research supporting the claim that companies with a masculine dominated organisational culture tend to prioritize a risk-taking and firefighting mentality over risk avoidance (Ely and Meyerson 2010). Masculine dominated organizational cultures are usually traditional male occupations which tend to encompass physical risks. Organisations can implement measures to increase diversity (such as conducting training sessions) that address the risks of a masculine dominated organisational culture.

**Focus on communication:** Communication is critical in any organization. HROs have developed a distinctive approach to communication that can be used by other organisations (Patterson et al. 2004). In this context communication is more than verbal communication between individuals. It covers any means of communication, including visual, gesture, electronic communication, and traditional face-to-face communication.

HRO cannot afford to learn and innovate from mistakes. The stakes are too high. HROs find different ways to engage in learning and innovation.



## Learning outcome 4

You will be able to understand risk management including the techniques for identifying hazards, the different types of risk assessment, considerations when implementing sensible and proportionate additional control measures and develop a risk management strategy.

### 4.1: Hazard identification techniques

#### Types of hazard identification techniques

The first stage in the risk assessment process is to identify hazards. What then, is a hazard?

A hazard is generally defined as: *"something with the potential to cause harm"*.

This means anything that has the potential to harm, or cause ill health, to people. When carrying out risk assessments, the potential for equipment or environmental damage is also usually considered.

In the simplest cases, visual observation will identify the significant hazards, along with some common sense. For example, a single-storey building will not present any hazards associated with stairs, and a cable trailing across a doorway is an obvious trip hazard.

The identification of more complex hazards for example, from chemicals, noise, etc. may require the use of measuring equipment such as air samplers and sound level monitors to be able to highlight the presence of such hazards.

In the most complex or high-risk cases (for example, in the chemical or oil and gas industry) special techniques and systems may be needed such as Hazard and Operability studies (HAZOP) and hazard analysis techniques such as event or fault-tree analysis. Specialist advice may be needed to choose and apply the most appropriate method.

#### Observation

The first and most important step in the risk assessment process is to correctly identify the potential hazards present.

A good starting point is to walk around the workplace and think about any hazards. In other words, what is it about the activities, processes or substances used that could injure workers or harm their health? For example, a trailing cable from a newly installed piece of electrical equipment, or a newly installed sample point for a toxic substance that requires manual samples to be periodically taken. Many hazards in the workplace can be identified simply by looking and watching.

Whilst checking manufacturers' instructions or data sheets can be helpful in identifying hazards, and in helping to develop control procedures, observing actual practices is important. Workers may use the equipment differently to way it was intended by the manufacturer, and the risks from hazardous substances can vary depending on how the chemical is used. Therefore, it is important to observe the activities.

## Task Hazard Analysis (THA)

THA, or Job Safety Analysis (JSA), is another hazard spotting technique. It involves observing a task and breaking it down into its basic steps. Each step is then analysed to identify actual and potential hazards. Once the hazards are known, control measures can be developed and implemented.

The methodology for THA is as follows:

- Select the task to be analysed.
- Break the task down into a sequence of steps.
- Identify potential hazards at each step.
- Determine control measures to overcome the hazards.
- Implement the control measures.
- Monitor and review.

Job Safety Analysis		
Safety information for sampling and testing		
Names of personnel		
Title of job or task	Sample the local wetland water	
Task	Hazards	Controls
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
Phone numbers:		Required Personal Protective Equipment (PPE):
Colleague:		
Supervisor/Manager:		
Emergency response: 000		
Other information: See your Supervisor/Manager for other information		
Contributors: Names of those undertaking this JSA		
Date:		
JSA Number:		

**Blank JSA template**

JOB HAZARD ANALYSIS Welding Operations		JOB TITLE: Oxyacetylene Welder	Created: 10/03/2021	Revise date:	JHA Creator: Michael Green	Title: OSHEM Saf Spec
		WORK LOCATION (Room no): Most welding shops	DEPARTMENT:		TOOL/MACHINE MAKE & MODEL: Oxyacetylene Welding machine Model DXS-867	
TASK(S)	Define Activities/Equipment Used (note frequency/duration)	POTENTIAL HAZARDS	REQUIRED CONTROLS/WORK PRACTICES			REQUIRED PPE
	Oxyacetylene Welding, used on average <b>X</b> times a day, <b>X</b> days a week by <b>X</b> # of welders					
1. Turn torch on	1a. Wipe down work area with damp cloth (water)	Spilling water could cause slip/trip. Not cleaning area could leave dust particles/combustibles that could flare	Slowly apply small amount of water to cloth and wipe down work area. Ensure fire extinguishers are available and charged.			N/A
	1b. Uncoil and straighten hoses from cylinders	Loose hose on floor could cause slip/trip. Damaged hose could cause leak/tire	Ensure uncoiled hoses will not be a tripping hazard. Ensure there are no kinks, cracks, or damage to hoses. Ensure all torch valves are closed and inspect for possible leaks.			N/A
	1c. Adjust screws on regulators so they are backed off.	Gas leak could cause fire	Ensure adjustment screws on regulators are backed off so no tension is present for both acetylene and oxygen.			N/A
	1d. Open cylinder valve slowly by turning counter-clockwise.	None	None			N/A
	1e. Turn adjustment screw clockwise to desired pressure	None	Know the correct pressure for type equipment			
	1f. Crack open acetylene valve on torch body	Potential gas accumulation if not prepared to light	Have striker available			Safety glasses, work gloves
	1g. Use striker to ignite torch	Potential gas accumulation Spark production (could ignite other material)	Quickly, so not to let gas accumulate, hold torch facing away from face, body, and portable unit. Using other hand, strike flint approx. 2 inches from tip to torch.			Safety glasses, work gloves
	1h. Adjust acetylene torch body valve	Incorrect adjustment could cause flame out, undesirable magnitude	Adjust acetylene torch body valve to desired flame			Safety glasses, work gloves
	1i. Open oxygen valve on torch body	Incorrect adjustment could cause flame out, undesirable magnitude	Slowly open oxygen valve on torch body to achieve desired flames			Safety glasses, work gloves
2. Perform weld	2a. Have flux and welding rods appropriate for type weld and material being welded	Improper weld due to improper selection of flux and welding rods	Welding training should cover when and how to use different fluxes and welding rods. Adhere to the training			

### A JSA for a welding activity







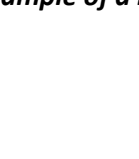
The findings from a THA/JSA may be used to develop a procedure for the task, and as also as a training aid.

### Checklists

Checklists can be a useful aid to the hazard identification process when used in conjunction with workplace observations. They remind the assessor of the range of hazards that can be expected to be found in the workplace. There may be a range of checklists in any given organisation. For example, offices, workshops, laboratories, process areas, etc.) as each work area will have a range of different hazards. Checklists can also be sourced from external organisations such as the UK HSE, or OSHA. For example, the HSE have a useful workplace transport checklist which can be used when carrying out a risk assessment of workplace transport arrangements. The checklists cover a wide range of different hazards, covering the roads, junctions, blind spots, the environment, the vehicle selection and maintenance, and the selection and competence of drivers.

Organisations may develop their own internal hazard checklists for routine work that they carry out. The content of these will be based on the organisation's experience of hazards that might be encountered. Checklists can be amended as different hazards are encountered (for example as a result of workplace changes). Checklists are particularly useful during subsequent inspections (after risk assessments have been completed) where they prompt inspectors to confirm that identified hazards are still being controlled.

Checklists are very useful because they remind the assessor of the wide variety of different hazards, which could easily be overlooked or forgotten. On the other hand, they can be restrictive. The risk assessor might focus too much on the hazards on the checklist, and not pay attention to other obvious hazards.

Hazard Zone Checklist - Jobs with intense activities like these, will likely cause sprains and strains.			
For each "caution zone job" find any physical risk factors that apply. If a hazard exists, you can make the job safer by reducing the risk factor below the hazard level.			
Movements or postures that are a regular part of the job.	Action required	Job:	No. of employees in these jobs?
	✓	Date:	
Awkward Posture		Comments/Observations	
 <p>1. Working with the hand(s) above the head, or the elbows above the shoulders</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>2. Repeatedly raising the hand(s) above the head, or the elbow(s) above the shoulder(s) more than once per minute</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>3. Working with the neck bent more than 45° (without support or the ability to vary posture)</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>4. Working with the back bent forward more than 30° (without support or the ability to vary posture)</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>5. Working with the back bent forward more than 45° (without support or the ability to vary posture)</p> <p>More than <b>2 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>6. Squatting</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			
 <p>7. Kneeling</p> <p>More than <b>4 hours total</b> per day</p> <p><input type="checkbox"/></p>			

*Example of a manual handling hazard checklist*

## 4.2: Risk Assessment

### The meaning of the term sensible risk management and the importance of applying proportionality when assessing and controlling risk.

The UK HSE have published information on Sensible Risk Management. They state:

*"Risk management is about taking practical steps to protect people from real harm and suffering - not bureaucratic back covering. Taking a sensible approach to risk management is about:*

- *ensuring that workers and the public are properly protected*
- *enabling innovation and learning not stifling them*
- *ensuring that those who create risks manage them responsibly and understand that failure to manage significant risks responsibly is likely to lead to robust action*
- *providing overall benefit to society by balancing benefits and risks, with a focus on reducing significant risks - both those which arise more often and those with serious consequences*
- *enabling individuals to understand that as well as the right to protection, they also have to exercise responsibility.*

*It is not about:*

- *reducing protection of people from risks that cause real harm*
- *scaring people by exaggerating or publicising trivial risks*
- *stopping important recreational and learning activities for individuals where the risks are managed*
- *creating a totally risk-free society*
- *generating useless paperwork mountains"*

The depth of analysis undertaken in an organisation needs to be proportionate to the hazards and risks. The more sophisticated the organisation then it is more likely that there are greater hazards that will need a more in-depth analysis. A greater depth of risk analysis would be required on an offshore oil platform than in an office. Conversely, for low-risk situations less effort will be required. Assessing the risks to an office worker would not be expected to consider the trivia such as paper cuts or trapping a finger in a lever arch file.

### Principles of, and Differences between, Qualitative, Semi-Quantitative, and Quantitative Risk Assessments

#### Qualitative Risk Assessment

A qualitative risk assessment does not attempt to quantify the risk. It describes the risk. The hazards are identified, and broad categories are used to describe the risk, such as High, Medium, or Low. Other descriptions can be used, such as Unacceptable, Tolerable, Acceptable. The HAZOP risk assessment methodology is qualitative and will describe the deviations from the intended process using 'guidewords'.

Some qualitative risk assessments may describe both the likelihood and the risk, and will follow a basic risk matrix methodology, but without the quantification. Combining these two categories of likelihood and severity will determine a broad level of risk.

Most everyday risk assessment is qualitative. It is not a highly precise method, but it is useful for most situations. The usefulness of the risk assessment depends on the experience and judgement of the risk assessor. The findings are highly subjective and based on the opinion of the risk assessor.

## Semi-Quantitative Risk Assessment

To a large extent, a semi-quantitative risk is similar to a qualitative risk assessment. The main difference is that it uses a numbering system to categorise the likelihood and severity, instead of using descriptors like "Unlikely" or "Major Injury". This makes the calculation of the overall risk rating even simpler. It also permits a more precise comparison between different risks. Whereas a qualitative risk assessment may have identified two different "High" risks, a semi-quantitative may identify one High risk with a risk rating of 9, and one High risk with a risk rating of 10. This shows that there is a slight difference between the two risk levels, because the latter risk is slightly higher than the former. This is a distinction that is not possible in qualitative risk assessment.

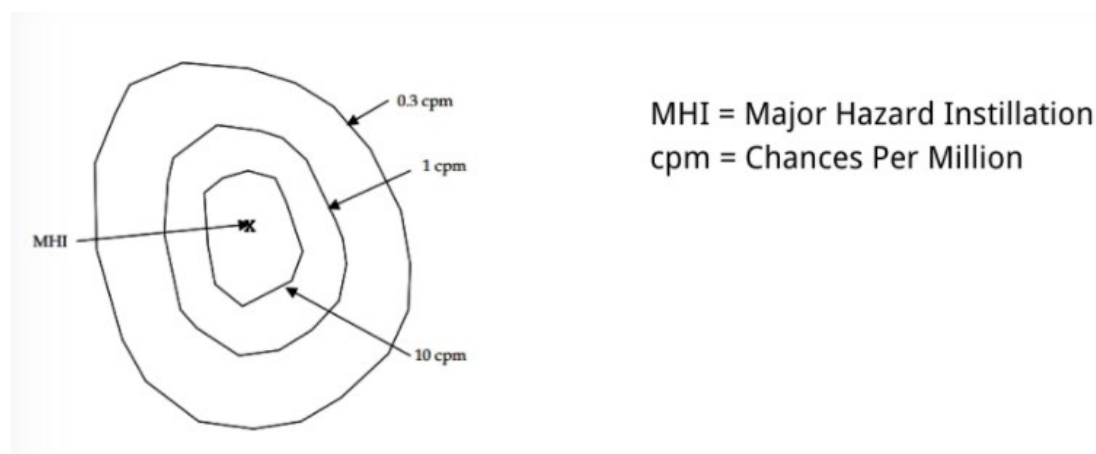
Despite the use of numbers, the numerical categorisation is still just a subjective estimation. The accuracy and usefulness still depends on the experience and judgement of the risk assessor.

## Quantitative Risk Assessments

These risk assessments are for complex risks and are based on equations using probabilities. There are several quantitative risk assessment techniques, and we will study two of these later (Event Tree Analysis and Fault Tree Analysis). Estimated failure rates are used in a sequence of events to calculate the probability of a failure. Manufacturers and insurers have large databases of data which can provide the reliability or failure rates of various components. Manufacturers often repeatedly test components until failure, to identify the average number of times a component can be used until it fails. The organisation may also have maintenance records which indicate the frequency of failure, and this can be used in the calculations.

The severity can also be quantified. There are various techniques for this depending on the risk. One of the techniques is consequence modelling, which will use computer software to predict the consequences of an incident such as a fire or explosion. It will consider all of the available data, such as the types of chemicals, the layout of the buildings and distances, the numbers of people and where they are located, wind direction, etc. It will use mathematics and physics to calculate effects such as blast pressure, thermal radiation, distance of flying debris, and pollution effects (smoke, etc.). Overall, this can predict potential fatalities, damage to buildings and facilities, environmental impacts, and lead to the identification for further design controls.

Quantitative risk assessments require extensive data. If the data is incomplete, unavailable, or inaccurate, this will affect the reliability of the risk assessment findings. Furthermore, these methods require significant expertise and access to expensive software. On the other hand, the findings are based on real data and are highly objective. It is very hard to argue with the findings of these assessments unless you are aware of a flaw in the data or model.



***An example of the consequence modelling of a major chemical incident.***

## How to engage workers at all levels in the risk assessment process

Workers deal directly with the hazards and risks associated with their job on a daily basis. This gives them a good understanding of what can go wrong and why. They will also understand what will help make their job safer. To assess the risks before you start the risk assessment process, discuss the task with experienced workers and supervisors who are familiar with it – and also with less experienced workers (who can be a ‘fresh pair of eyes’).

Workers will also have knowledge of what control measures work in practice, and which ones are impractical. When agreeing what control measures should be used, it is vital to get the consent of the workers who are the people who have to use these controls. If the control measures make their job more difficult, then they are unlikely to be used. Workers will just take shortcuts.

Involving workers in the hazard identification and risk assessment process will help develop their sense of ownership of the risk assessment. Instead of the risk assessment being a management initiative, they will feel a part of the process. This means that they are more likely to believe the information it contains, and it will encourage them to follow the control measures it stipulates. Furthermore, involving the workers in the hazard identification increases their involvement in health and safety overall, contributing to the generation of a positive safety culture. Managers who have the humility to ask their workers’ opinions on hazards demonstrate a high level of commitment to improving the working conditions and safety performance.

## When dynamic risk assessments/situational awareness should be used

Some emergency situations must be dealt with quickly. They are unpredictable, unplanned, and hazardous. Whilst a generic risk assessment can assess the common risks, each emergency will be unique. The persons intervening will have limited information on the size and complexity of the problem until they arrive. Therefore, they must do a ‘dynamic’ risk assessment. This involves making swift decisions on what the risks are, how to protect themselves and others, and keeping these decisions under review as the situation evolves. They often must make decisions on their own, in what can often be a high-pressure and stressful environment.

A growing number of professions resort to making dynamic risk assessments:

- Maintenance engineers when attending an urgent breakdown. The process has stopped. Production management want the process to be repaired as soon as possible. The engineer is under pressure to get the machine fixed, but they do not know what the problem is. The engineer must test the equipment and start fault-finding. This can expose them to dangerous parts of the machine and electrics, often in cramped areas with poor lighting. On nightshifts, engineers often work alone.
- Police officers attend crime scenes and incidents, with only basic information on what is occurring and who is involved. There is no time to document a risk assessment. They are trained to consider the risks to themselves and basic guidelines to follow to stay safe.
- Fire-fighters attending a fire incident. Each fire is different. Some may involve the rescue of people inside a building. The person in charge must consider the risks to the fire-fighters and the people inside and make decisions on the best approach to extinguish the fire and how to enter the building to carry out a search.

HM Fire Service Inspectorate (1998) described dynamic risk assessment as:

*"The continuous assessment of risk in the rapidly changing circumstances of an operational incident, in order to implement the control measures necessary to ensure an acceptable level of safety".*



The difficulty with dynamic risk assessments is that they require experience and training to do properly. Whilst each incident will be different, an experienced person will be able to predict the risks and plan accordingly. Dynamic risk assessments must only be carried out by people who can handle the pressure of an emergency. It requires a calm and systematic approach, regardless of the pressures.

### **Link between Risk Assessment Output and Risk Controls**

Once an organisation has identified its hazards, it can analyse the risks by producing a risk profile that gives a rating of significance to each risk and provides a tool for prioritising where resources should be spent. This ranks the relative importance of each identified risk.

Profiling allows risks to be mapped to specific areas where descriptions of current controls are provided and an indication is made regarding whether control investments levels may be improved, cut or redistributed/reassigned.

Risk analysis identifies the risks requiring urgent management attention, enabling the organisation to operate successfully and efficiently; whilst allowing the prioritisation of risk controls in terms of their organisational benefits.

Once an organisation has identified and evaluated the risk, it then must decide how to manage it.

### **Factors affecting the choice of sensible and proportionate control measures:**

In any given set of circumstances, some risk control measures will be more appropriate than others. Control measures that protect everyone rather than each individual, are preferable. For example, in noisy environments it is better to enclose the piece of noisy equipment, reducing the noise levels for everyone, rather than provide all workers with hearing protection and expect them all to use it.

Ideally risk controls would be put in place to reduce the risk completely to zero. However, in practice this may not always be achievable. Therefore, the control measures that are practicable and can reduce the risk the greatest, are the most preferred option.

Factors to consider when selecting controls include:

#### **Whether a short-term or long-term solution is required**

If the situation is temporary and will only last a short time, then a fast and cheap option like training and PPE will be appropriate. If the risk is a permanent part of the process, it will be financially viable to introduce longer-term measures. PPE and training are effective quick fixes to immediately reduce the risk whilst longer-term measures are investigated and introduced. Unfortunately, it can take time to install engineering controls.

#### **Applicability**

It is important not to take a blanket approach to the use of controls. For example, many sites require excessive PPE to be worn despite this offering no protection. Hard hats only provide protection against objects falling from above. If there is nothing above you except the sky, then there is no real need to wear a hard hat. The controls selected must be applicable and relevant to the risk you are attempting to control.

### **Practicability**

Some countries, like the UK, require organisations to control some risks so far as is practicable. This means that they must do everything technologically possible to control the risk. Since technology regularly progresses, the controls selected must be kept under review since more effective technologies may have been developed.

### **Cost**

As previously discussed, the organisation must attempt to strike a balance between the benefits of risk reduction and the cost, time, trouble, and effort in controlling the risk. The costs must not be excessive or 'grossly disproportionate' compared to the risk reduction. If the risk is quite small, then the introduction of PPE and some training by themselves is perfectly acceptable.

### **Proportionality**

Control measures should be proportionate to the level of risk. High risks will require significant effort to be invested in control measures, using controls from all parts of the hierarchy of controls. However, low risks will require very little effort except for regular monitoring.

In general, a control measure is more effective if it does not rely on human involvement; necessary maintenance is the exception. It is foreseeable that, where control measures rely on people, there will be occasions where they will not be used whether unintentionally or deliberately.

### **Legal requirements and standards**

The choice of controls also needs to consider any specific legal requirements and standards relevant to the identified risk. Local regulations may require that certain pieces of equipment be guarded, or that certain training is delivered. Therefore, this control measure is legally required and must be implemented, regardless of proportionality, cost, effectiveness, or other considerations.

### **The competence of the workers and relevant training**

Measures introduced that may require the introduction of new equipment may require workers to undergo further training which is an additional cost to the organisation. For example, the introduction of mobile elevated work platforms (MEWPs) for working at height, will require workers to undergo specific training, which may have to be periodically repeated.

## **Organisational Arrangements for Implementing and Maintaining an Effective Risk Assessment Programme**

### **Procedures**

An effective risk assessment programme must be based on a procedure for risk assessments. This will set out the process identifying:

- The people responsible for carrying out the risk assessments.
- How the risk assessment team will be put together.
- The level of competence and training required to carry out a risk assessment.

- The frequencies of review of risk assessments.
- The areas and activities need to be risk assessed. It will also specify that temporary and non-routine activities must be considered and assessed.
- The tools in place to assist the team (checklists, access to expertise and advice, etc.).
- The documents to be used.
- The arrangements for reviewing the findings of the risk assessments.
- The arrangements for agreeing corrective and improvement actions, along with the necessary authorisations and assigning responsibilities for completion.
- A mechanism to review the effectiveness of the actions.
- Arrangements for the communication of the risk assessment findings and controls to all relevant people.
- Clear authorisation for risk assessors to stop the job if there is a serious and imminent danger.

## **Recording Protocols**

We have already explained that the documentation of risk assessments must be kept to the minimum necessary for their communication and the management of risks. Nevertheless, many organisations have complex risk assessment systems due to the complex nature of their activities and their large size. Furthermore, enforcement agencies and insurers wish to see evidence of risks being considered in the risk assessments, and this drives organisations towards greater and greater levels of bureaucratic complexity.

When a large number of risk assessments are held on file, it is useful to keep a 'register' of risk assessments so the organisation can see all of the risk assessments that are current active, where they are stored, when they were created, and when they are due for review.

The organisation must only record the "significant findings" of the risk assessments. But each one will contain basic information, such as:

- Area, equipment, location being risk assessed.
- Names of the risk assessors.
- Name of the person who approved the risk assessment findings (if applicable).
- Date of the risk assessment.
- Date of planned review.
- Details of the risks, who and how people could be harmed.
- Whether these risks are controlled or not.
- Control measures to be followed.
- Further controls necessary, if necessary.

The risk assessors should sign the risk assessments to ensure they are valid, and as evidence they were indeed the people who carried it out.

It is also useful to include a 'version number' on the risk assessment so that it is easy to see which is the latest version. When operating a paper-based system, it is possible that someone may be in possession of an out-of-date risk assessment.

## **Training and Competence**

People who carry out risk assessments must be trained and competent to do so.

The risk assessors need to be trained in the organisation's risk assessment procedure, so they know what needs risk assessing, how often, with whom, what documentation needs to be kept, how to address serious and imminent risks, who to report the findings of the risk assessment to, etc.

Furthermore, they need training in the risk assessment process. That means giving them a basic understanding of the definitions of hazard and risk, and how risk is categorised. They need to understand the factors that influence likelihood and severity, so they can estimate, to a reasonable level of accuracy, the overall risk rating.

The organisation must select carefully who should carry out its risk assessments. They should consider:

- The level of risk of the process, and whether the risk is simple enough to be suitably risk assessed internally, or whether external expertise is needed.
- Whether an individual will carry out the risk assessments, or whether a team approach is needed.
- The level of training the individuals have in risk assessment.
- Their understanding of the risk assessment process.
- Their knowledge of the process, activities, and the workplace.
- Their general knowledge of health and safety law and standards. They must be able to recognise breaches of legislation, and where current controls fall short of good industry practice.
- Their knowledge of the organisation's health and safety management system.
- They must have good attention to detail, be reliable (so they can carry out the risk assessments on time) and be someone who can be trusted to get the risk assessment done properly.
- They must have good communication skills, since this requires discussion with those who do the job. Also, the findings must be reported to someone with authority to implement additional controls, so good communication skills to explain the risks and suggest improvements are also necessary.
- They should have reasonable IT literacy skills so they can record and store the risk assessments electronically. They must also have reasonable report writing skills, since they may have to write a report to management.
- They would benefit from being involved with the workers or trade unions.
- They should be aware of their own limitations and be humble enough to ask for assistance and advice.

## **Responsibilities**

Ideally line-managers must be responsible for carrying out the risk assessments for the areas and activities under their control. This will develop their sense of ownership of health and safety and the safety rules they implement. If managers are not directly responsible, then they should at least be intimately involved in all the risk assessments affecting their areas.

The overall process of risk assessment will be managed by the Health and Safety Team or Manager. Their role is to ensure that the risk assessments are completed, on time, to the correct level of detail and quality, that risk assessors are trained and competent, and to offer advice and assistance whenever requested.

It is management's responsibility to provide all necessary resources for the risk assessment process and the completion of any resulting actions.

## **Authorisation**

It is good practice for the risk assessment to be checked and approved before it becomes official.

This is a second opinion, usually by a member of the Health and Safety team. If the risk assessment appears not to have been done correctly, it can be returned to the risk assessment team with questions and/or comments on improvements. If the risk assessment is suitably done, then the document will be approved. This then leads to implementation of any actions, and communication of the findings to the workers.

In many cases, the risk assessor and line-manager will lack the necessary authority to agree certain actions, due to their significant cost or change in ways of working. Therefore, the procedure must identify which people have the necessary authority to approve major changes. Without a clear responsibility, risk assessors will not know how to get the necessary approvals for the additional controls.

The actions and additional controls recommended by risk assessments must be allocated to action 'owners'. These are people responsible for implementing the actions. When many actions are in progress it can become difficult to keep track of them all. Therefore, it will be necessary to make someone responsible for tracking them through to completion and reporting to management any actions that remain incomplete. The progress against these action plans will be reviewed on a regular basis at management meetings.

## **Monitoring**

The organisation must regularly check that the controls stipulated in the risk assessments are in use. There is no point in specifying a safety rule, such as the mandatory wearing of hearing protection, if both the workers and the local managers ignore this. Therefore, there must be a mechanism to regularly check the rules are being followed and whether they are effective.

## **Review**

Few workplaces stay the same. Eventually, changes will be made, such as the introduction of new processes, new equipment, new substances, even new people. Activities will be changed; equipment may be moved. So, it makes sense to review the risk assessments on a regular basis, to see what changes have been made and whether these affect the risk levels.

There is no fixed timeframe for reviewing a risk assessment. Many organisations review these annually. But it can be more frequent or less frequent, depending on the situation. A large construction site will always be changing and evolving as the project advances. It would therefore make sense to review the risk assessments very frequently as the layout of the site and activities change. On the other hand, a low-risk office environment may only need to be reviewed every two years.

As a rule, a risk assessment should be reviewed when:

- A certain time has lapsed, and there is a suspicion the risk assessment may be out of date.
- An incident or accident has occurred. This would indicate that either the controls have not been used, or the risk assessment failed to correctly identify the risk and what controls were needed.
- Changes have been made to the layout of the workplace. Or the location of the workplace changes.
- New processes and/or activities have been introduced, or existing ones have been changed.
- New technologies have been introduced.
- A major change has occurred in the workforce. For example, a growing number of apprentices, or an influx of migrant workers speaking a different language.
- A third party requests it. For example, an enforcement agency may require risk assessments to be reviewed. Or an insurance company auditor may recommend this.

- There have been complaints from the workers or the Health and Safety Committee that the risk assessments are no longer valid.
- New information is discovered by the industry, showing some risks which were previously unknown.
- Significant changes are made to working arrangements, such as shift patterns and break times.

### **Acceptability/tolerability of risk**

How do we know whether a risk is acceptable or tolerable?

In this context, risk is the combination of the likelihood and the consequence of a specified hazardous event.

The law in many countries requires employers to do everything "reasonably practicable" to protect people from harm. Often, this can be done by comparing what is being done with international standards, or good practice. In the UK, organisations are required to reduce risks to "as low as is reasonably practicable" (ALARP).

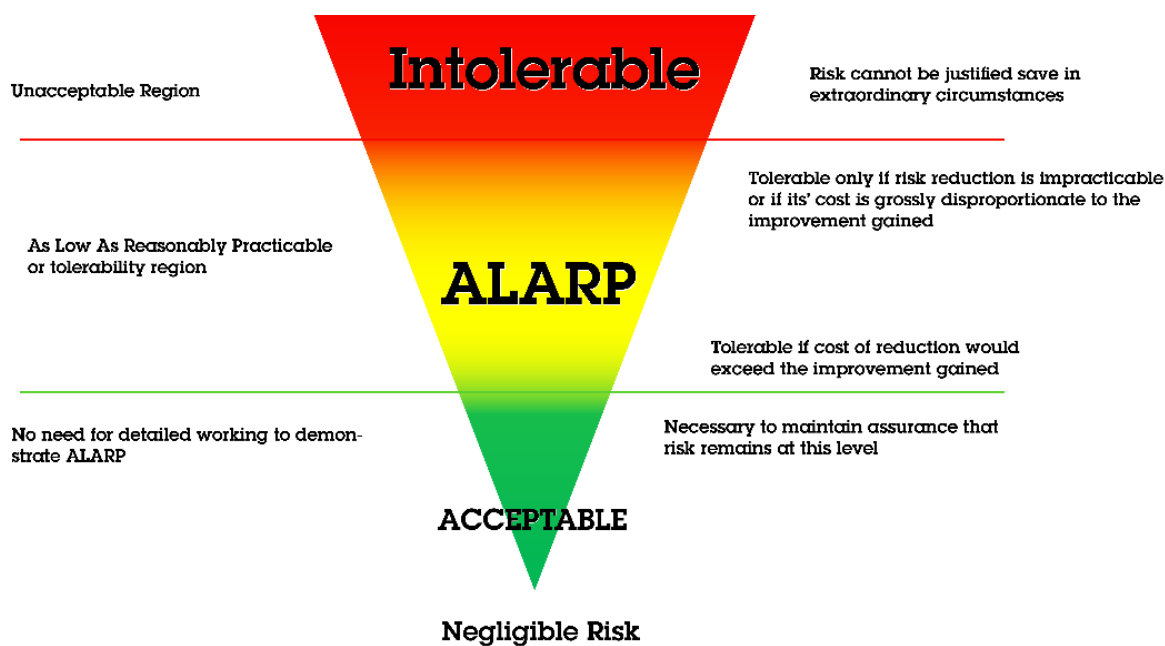
This is a balancing act with the level of risk on one side and the costs in terms of time, effort, money needed for rectification on the other side.

ALARP allows for grossly disproportionate actions to be deemed unnecessary for example: spending £1 million to repair a small leak in a roof in an unoccupied building would be grossly disproportionate however spending £1 million on fire prevention systems on an oil refinery which could potentially kill hundreds of people is proportionate.

These are extreme and obvious examples. In practice, it is often more difficult to decide.

The following factors are likely to be considered when deciding whether a risk has been reduced as far as reasonably practicable.

- Health and safety guidelines and codes of practice.
- Manufacturer's specifications and recommendations.
- Industry practice.
- International standards and laws.
- Suggestions from advisory bodies.
- Comparison with similar hazardous events in other industries.
- If the cost to continue to reduce the risk further became disproportionate.





## 4.3: Risk management

### Organisational Risk Profiling

Every organisation should have its own **risk profile**. This is the starting point for determining the greatest health and safety issues for the organisation and is something that the health and safety professional should advise on. In some businesses, the risks will be tangible and immediate safety hazards, whereas in other organisations the risks may be health-related, and it may be a long time before the illness becomes apparent. The risk profile enables organisations to prioritise resources and efforts to manage the most significant risks.

A risk profile examines:

- The nature and level of the threats faced by an organisation.
- The likelihood of adverse effects occurring.
- The level of disruption and costs associated with each type of risk.
- The effectiveness of controls in place to manage those risks.

Risk profiling is building a basic picture of the set of **major** risks that the **business** faces and using it for decision making. Therefore, it is recognition of risks affecting the organisation including business disruption and associated business costs and **not** specific risks of work at height, etc. It is a holistic approach referring to management of health and safety as a whole and therefore is an analysis of the processes involved in risk management within the organisation.

**External risk profiling** affects external public, clients and stakeholders and may consider ill-health (pathogens), environmental issues, public reaction (reputation) or security (terrorism).

**Internal risk profiling** of the corporation may consider legal compliance (claims, liability), assets of staff (security of staff), assets of the facilities (rusting of equipment, etc.) or assets of privacy (cyber security).

As an example, it is no good spending millions of pounds on a state-of-the-art administration building if the organisation is unable to keep hazardous products in the constraints of a process plant where potentially catastrophic consequences occur such as a toxic cloud engulfing the local population.

The outcome of risk profiling will be that the right risks have been identified and prioritised for action. Large risks should be acknowledged, and steps taken to minimise risks. Minor risks should be appropriately prioritised, again with steps taken to minimise the risks. Organisations need to remember that ignoring smaller risks can often lead to them becoming an underlying or root cause with larger detrimental impacts at a later date. Details of risk control measures that are needed should be recorded and then used as a basis for setting the health and safety budget for the forthcoming year. Some organisations will work on a three- or five-year plan, but need to make sure that in these instances, that the risks and controls are reviewed annually to ensure that they are still current and that the budget set will still be suitable for the required actions.

In public funded bodies such as charitable organisations, it is a legal requirement that the organisations' trustee board undertakes a risk profiling exercise each year and states their findings in the annual report in the accounts.

The UK HSE website has a number of free documents relevant to risk profiling.

Another useful resource is HSG65 which can be downloaded from the HSE website free of charge.

## Why health and safety risks must be integrated into main business risk

UK HSE guidance in HSG65 (*Managing for Health and Safety*) highlights that managing health and safety risks forms a part of managing the wider business risks.

Research undertaken on behalf of the HSE involving a number of case studies, confirms this viewpoint. The research concluded that: “organisations decided to improve aspects of health and safety because their business cases showed the benefits to the organisation”.

Linking health and safety risks to the wider business agenda is reflected in the new ISO 45001 management system standard. This states that ISO 45001 “concentrates on the interaction between an organisation and its business environment”, whilst its predecessor, OHSAS 18001, was focused solely on “managing OH&S hazards and other internal issues”.

As such, ISO 45001 should be aligned to the strategic direction of the organisation, incorporating occupational health and safety management into the core business functions, rather than treating health and safety as a standalone discipline.

The Financial reporting council guidance (formerly the “Turnbull report”) on the Combined Code on Corporate Governance requires listed companies to have robust systems of internal control, covering not just ‘narrow’ financial risks but also risks relating to the environment, business reputation and health and safety.

## Common Risk Management Strategies

Risk management may be defined as *“the forecasting and evaluation of financial risks together with the identification of procedures to avoid or minimise their impact.”*

Common strategies that are used are:

- Risk avoidance
- Risk reduction
- Risk transfer
- Risk retention, with or without knowledge

We will discuss each of these strategies in further detail.

### Risk Avoidance

Risk avoidance is the knowledge-based choice not to be involved in an activity/task so as not to be exposed to the risks.

Risk avoidance is the best solution with respect to managing risk. It involves the elimination of hazards, activities and exposures that can negatively affect an organisation’s assets.

Examples include:

- Discontinuing the process completely or avoiding the risky activity.
- Eliminating a hazardous substance from use, or a hazardous piece of equipment.
- Avoiding the risks of air and car travel, by not travelling to a meeting. Instead, an electronic meeting can be held via the internet.
- Redesigning a process or activity to eliminate a risk completely. Such as eliminating working at height for window cleaners. Instead, the cleaners can use an extendable pole to reach the high windows.

However, eliminating one risk may introduce another. For example, in automating a task by introducing robots (to eliminate manual handling), there are new risks associated with the use of robots.

One disadvantage is that organisations may lose out on benefits associated with the activity. Activities that are risky can be profitable or provide other benefits to the organisation, for example, trapeze and high wire performers in the circus are high risk, but large audiences are attracted by the excitement.

Ultimately, commercial organisations must make a profit. And to make profit risks must be taken.

Risk avoidance is suitable when:

- There is a financially viable alternative.
- The risks are so great, they cannot be justified.

### **Risk Reduction**

Where avoidance is impractical, risk reduction might be a more viable option. This strategy involves implementing a loss control programme to protect the organisation from risk that could result in loss. This is done by implementing controls usually involving engineering, procedural and behavioural measures. The aim is to reduce the likelihood and severity of losses until the risk is lowered to an acceptable level. Obviously, this requires the organisation to define what is the 'acceptable level of risk'.

Risk reduction can involve the use of health and safety management systems and the hierarchy of controls.

Where losses cannot be prevented, risk reduction will also include mitigation strategies to reduce the severity of losses (through emergency planning), and business continuity plans to enable the business to continue trading despite the incident.

For example, a professional scaffolding company's main safety risks are working at height and falling objects. They will reduce the risk by:

- Purchasing suitable materials for the scaffolding.
- Developing and implementing safe systems of work for the erection of scaffolding.
- Ensuring their scaffolders are competent, through training, instruction, and regular briefings.
- Ensuring the design of new scaffolds is safe before erecting these.
- Monitoring the condition of the scaffolding during erection, after erection, and regularly thereafter.
- Monitoring the behaviours of the scaffolders and compliance with the agreed Safe System of Work.
- Providing the use of fall restraint and fall arrest harnesses to scaffolders and ensuring these are used correctly.
- Providing lifting equipment to lift scaffold components to the necessary height.
- Putting in place barriers and signage to protect members of the public.

- Securing access to the scaffold when it is not in use, to prevent children and other trespassers from climbing it.

All the above measures aim to reduce either the likelihood or severity of an incident.

As risk reduction is suitable for a range of risks, it is the most common approach. It lets organisations continue with the activity, but with measures in place to make it less dangerous. The danger is that your controls are ineffective, and you end up still suffering the loss that you feared

### **Risk Transfer**

Most commonly, this is to buy an insurance policy. The risk is transferred to a third-party entity (in most cases an insurance company). To be clearer, only the financial risk is transferred to a third-party. For example, a homeowner's insurance policy does not transfer the physical safety risks of a house fire to the insurance company. It only transfers the financial risk i.e., the cost of replacing the contents of the house and rebuilding the house itself. Risk transfer does not avoid or reduce a risk in any way. The house fire is still just as likely as before. It is often not possible to transfer the entire financial risk. There will always be some indirect costs which are not quantifiable or insurable. For example, an organisation can insure the cost of rebuilding its factory, but this does not solve the problem of how to continue supplying customers in the meantime.

As long as affordable insurance is possible, this is a good choice for large impact risks such as fires and flooding.

Another method of transferring risk is to subcontract the risk to another person or organisation. For example, a manufacturer may decide to subcontract a hazardous chemical process to another organisation who specialises in that type of work. This option is acceptable when your organisation lacks the knowledge, expertise, and equipment necessary to carry out an activity.

### **Risk Retention (with or without knowledge)**

When a risk is retained, the potential benefits or losses are accepted. This strategy involves the organisation retaining the risk and having to fund any consequences from their own finances. The benefit is that the organisation saves on the costs of risk reduction and transfer.

If there is no significant economic threat and the risks are small, then this method can be effective. It can also be a choice for those organisations that are able to set aside a large fund to pay for any losses when they occur.

For example, an organisation may have a significant fire risk, and the insurance premiums are very expensive. To reduce the premiums, they may choose to pay a large excess in the event of any claim. They may even decide not to have insurance against fire. Instead, they accept there is a risk of fire and the potential for loss. They work proactively to reduce the risk of fire (risk reduction) and set aside some of the profits each year to create a large emergency fund of cash. They can use this to repair fire damage and deal with other financial consequences. This would be called "self-insurance". Hopefully, the organisation will not suffer the loss, and will not have to spend the money it has saved.

This strategy can be useful if:

- The organisation can save large amounts of cash or has the cash available to survive any losses.
- Insurance premiums are not financially viable.
- The organisation has the expertise and rigorous systems in place to manage the risk adequately.

In some cases, risk is retained without any insurance or contingency plans, because the insurance is unaffordable. For example, an individual may not be able to afford health insurance.

*"With knowledge"* means that a conscious decision has been made by the organisation to bear the losses from their own funds.

*"Without knowledge"* means that organisations retain some of their risks because they are completely unaware the risks exist. Therefore, the risks are not reduced or transferred in any way. They are retained within the organisation until they are identified or lead to a loss.

## **Selection of Optimum Solutions**

It should be said that risk management solutions are dynamic. That is, the best method today may not be the best method in a year's time, as frequency and severity of losses may have changed or the cost of implementing different solutions may have changed (such as significant increase in insurance premiums).

The selection of the optimum solution will depend upon the availability of relevant risk data, the type and size of the organisation and its ability to withstand losses. If the likelihood and consequences of an incident is high, then significant money may need to be spent to reduce the risk.

This could involve avoiding the risk by ceasing an operation, reducing the risk by spending money on control measures and, in addition transferring risk to an insurer or contractor. In high-risk industries, insurers would be unlikely to insure unless the organisation could demonstrate high standards of health and safety management.

Factors to consider include:

## **Legal Requirements**

Specific legislation may influence a solution. For example, machine guarding legislation in Europe demands that dangerous parts of machinery must be guarded. Therefore, risk reduction is an appropriate solution. Safety cases and reports are required for major hazard installations in the UK, Europe, and Australia, before they are permitted to be constructed.

## **Ethical, Moral, and Social Considerations**

After a major accident, there is often a call for organisations to guarantee that such accidents can never happen again. Unfortunately, human beings make mistakes and machinery sometimes fails. Organisations need to have systems in place to ensure that risks are reduced to the lowest levels reasonably practicable.

A common moral argument is that people's lives matter, and that risk control decisions cannot be made purely for financial reasons. The price that an individual pays for lack of adequate control can range from personal injury to death. Other personal costs are job losses. Society expects organisations to go beyond the legal minimum and to place a high value on human health and wellbeing.

Whilst accidents have associated direct costs to an organisation, they can also affect workers' motivation and morale. This can result in additional costs, such as reduced productivity, higher staff turnover, and increased sickness absence. Organisations need to demonstrate to workers that they are prepared to, when necessary, go beyond the

bare minimum legal requirements to protect workers. However, spending money to prevent accident and injuries "at all costs" may not be in the best interests of the organisations long term financial survival.

## Technology

Technology has long played an important role in the development of workplace safety. As technology advances, so too must risk controls include more modern technological solutions. For example, process control systems evolved from simple programmable logic control systems (PLC), to far more effective, computer controlled, supervisory control and data acquisition system (SCADA). Such systems have been around for a few years now and have undoubtedly helped prevent potential accidents. With technology constantly improving, there are interesting methods and gadgets that have recently been unveiled, or soon will be, that will only help further enhance workplace safety.

## Economic State of the Organisation

The economic state, and goals, of a company will influence its approach to risk control. An organisation with vast cash reserves can afford to spend more than one that has severe financial constraints.

The economic goals of an organisation may range from making enough money to survive (covering its costs) through to maximising profits. The cost of risk control measures, therefore, must be carefully weighed against the reduction in potential loss from the organisational risks.

It has estimated that some 70% of businesses that suffer a major fire, fail within two years of the fire. The transfer of fire risk to an insurance company, knowing the premium costs, allows a degree of certainty in the event of a fire and its associated costs. A balance must be made, therefore, in the cost of risk transfer and the potential costs of fire losses.

## Principles and Benefits of Risk Management

The international standard BS ISO 31000:2018 includes a number of principles that risk management should verify:

- creates and protects value
- is based on the best information
- is an integral part of organisational processes
- is tailored
- is part of decision-making
- takes human and cultural factors into account
- explicitly addresses uncertainty
- is transparent and inclusive
- is systematic, structured and timely
- is dynamic, iterative and responsive to change
- facilitates continual improvement of the organisation

According to the UK HSE "*Risk management is about taking practical steps to protect people from real harm and suffering, not bureaucratic legal protection. Taking a sensible approach to risk management is about:*

- *Ensuring that workers and the public are properly protected.*
- *Enabling innovation and learning not stifling it.*

- *Ensuring that those who create risks manage them responsibly and understand that failure to manage significant risks responsibly is likely to lead to robust action.*
- *Providing overall benefit to society by balancing benefits and risks, with a focus on reducing significant risks, both those which arise more often and those with serious consequences.*
- *Enabling individuals to understand that as well as the right to protection, they also have to exercise responsibility".*

The benefits of effective risk management are:

- Protecting workers and the public from injury and ill-health.
- Reducing worker sickness and absenteeism, leading to greater productivity.
- Reducing the organisation's insurance premiums.
- Protecting the business against foreseeable and unforeseeable risks.
- Reducing the costs of poor health and safety management, such as lost time, legal costs, fines, reduced productivity, sick pay, increased recruitment and training, adverse publicity, etc.
- Keeping clients satisfied and maintaining or increasing sales. A large incident can prevent an organisation from meeting its clients' needs, therefore leading to loss of contracts, and even financial penalties.



## Learning outcome

**5.1-5.2:** You will be able to develop and implement proactive and reactive health and safety monitoring systems and carry out reviews and auditing of such systems.

## 5.1: Loss causation and quantitative analysis of data

### Theories/models and use of loss causation techniques

#### Understanding some of the underlying principles connecting causes and outcomes

As most health and safety professionals are aware, incidents with the same causes can lead to different outcomes. This was well established by the Bird (or Heinrich) triangle, which stated that there are a range of different possible outcomes from an incident. For example, a maintenance man working at height drops a spanner when stretching over the handrail of a scaffold platform to unbolt a flange, drops the spanner (causes include poor design of the scaffold and failure to “tether” the spanner.)

The accident triangle offers a statistical relationship of possible outcomes, which are fatal /serious injury, minor injury, damage to equipment and a near miss. The outcome of the falling spanner is a matter of “chance” – it may hit the floor harmlessly, with only a near miss outcome, it may hit equipment and damage it, it might strike someone a glancing blow and cause bruising, or it might strike someone on the head, causing serious or fatal injury.



The theory of the triangle is that if things are left to chance (such as ignoring the near miss with the spanner) sooner or later a serious, even fatal, will occur.

When investigating incidents, it is important to not only investigate incidents where the outcome was serious, but to put the same investigation effort into those incidents which had serious *potential*, in order to identify root causes.

Even today, Bird’s triangle remains an important tool in communicating the importance of health and safety, and in particular the need to properly investigate incidents which occur “at the lower end” of the triangle.

As a training aid, the triangle provides a strong visual representation of the relationship between near misses, minor incidents, and the more serious incidents. Critically, the triangle shows a numerical link between relatively minor incidents and a more serious one.

By using an organisations own data, the triangle can indicate a need for improvement in a near miss reporting programme.

## Limitations of triangle theories

Statistics on which Heinrich based his theory (insurance records, and from plant managers) assume that databases from where the information came, were complete. Certainly, serious injury information will be accurate, but perhaps not all minor injuries or near misses were recorded.

Another issue concerns actual event outcomes. The triangle does not really consider risk potential. For example, reducing the number of minor injuries may not necessarily reduce the risk of a serious or fatal injury.

The triangle basically assumes that human behaviour is the main factor in incident outcome – it does not consider management system or decision-making failures (later addressed by Bird's domino theory).

Finally, incidents are often looked at as a single sequence of events and not, as Bird later recognised, multi-causal.

## Theories/models, tools, and techniques

### Multi-Causality Theory

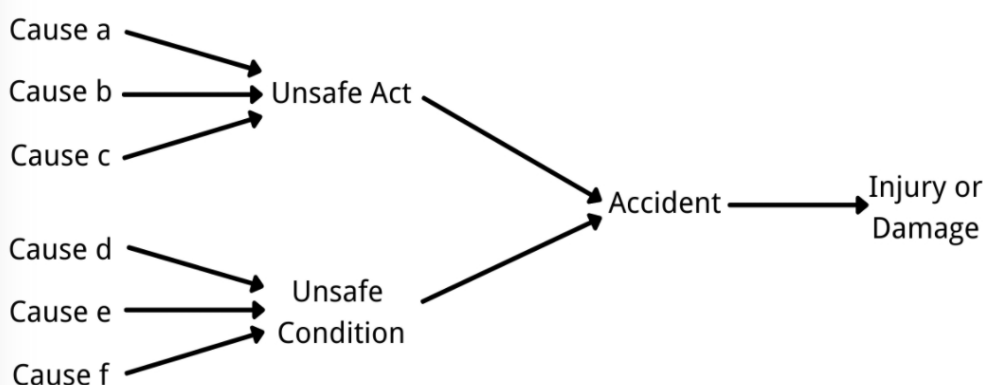
Usually, simple accidents have a single cause, but the consequences tend to be minor. A major accident has catastrophic consequences, but the causes tend to be much more complex, with many chains of events and causes leading to the catastrophe. This is normally referred to as Multi Causality Theory.

Behind every accident, there are many contributing factors, causes and sub-causes.

The Multi-causality theory is based around the fact that these contributing factors all combine randomly to cause an accident. Therefore, during accident investigations, it is vital to identify as many of these causes rather than one cause as per the domino theory model.

The accident model is a mixture of both the domino and multi-causality theories, such as shown below:

### Multiple Causation



*Example of how multiple causes come together to trigger an accident*

### Immediate, Underlying, and Root Causes

The purpose of an incident investigation is to determine as many causes as possible, and to correct them. When investigating the more serious incidents it is necessary to go beyond identifying Immediate causes. The Immediate cause is the most obvious reason why an adverse event happens. For example: putting a hand on a sharp guillotine

blade. In such cases, it is vital to identify the Underlying and Root causes, the less obvious 'system' or 'organisational' or 'management' reasons for an adverse event happening. For example: no system in place for maintenance or inspection of machine guards.

### **Immediate Causes**

Immediate causes are often broken down into 'unsafe acts' or 'unsafe conditions'.

An unsafe act may be defined as "the performance of a task in such a manner as to threaten the health and safety of workers". It is often contrary to a safety procedure. Examples include:

- Unauthorised use or operation of equipment
- Removing or making safety devices inoperative
- Using defective tools or equipment
- Working at height without fall protection
- Using tools or equipment in an unsafe manner
- Riding on hazardous moving equipment
- Engaging in horseplay, which is distracting and sometimes dangerous
- Failure to wear personal protective equipment

Unsafe conditions may be defined as conditions in the workplace that are likely to cause property damage, ill health, or injury. Examples include:

- Lack of adequate guards or safety devices
- Lack of adequate warning systems (e.g., fire alarms, etc.)
- Poor housekeeping (causing slip and trip hazards)
- Protruding object hazards
- Hazardous atmospheric conditions (e.g., ice, snow, rain, heat, sun)
- Defective tools and equipment
- Inadequate lighting and heating

It should be remembered from earlier that unsafe acts and conditions are caused by the faults of people or by the environmental conditions. We need to look beyond this to determine the reasons for these faults i.e., the Root causes.

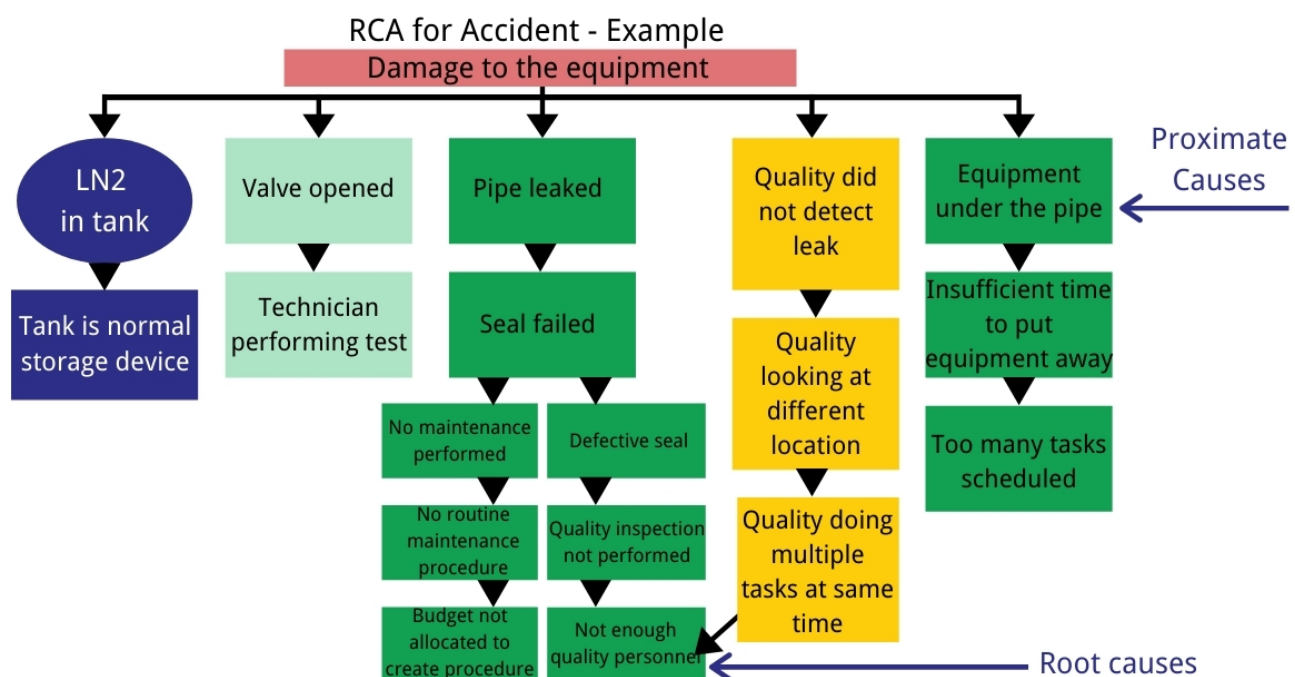
### **Root Causes**

Root causes are much deeper and rooted in problems within management, planning, and organisational culture. These root causes lead to the situations, events and behaviours that lead to the incident occurring. The definition of a root cause is: "The most basic cause (or causes) that can reasonably be identified that management has control to fix and, when fixed, will prevent (or significantly reduce the likelihood of) the problem's recurrence."

Examples of root causes include:

- Production pressures leading to workers and managers taking shortcuts in safety procedures.
- No consideration given to health and safety in scheduling production or deliveries.
- Lack of resources or commitment to safety by management.
- Lack of supervision, or a culture of tolerating unacceptable safety behaviours.
- Lack of safe working practices tolerated and condoned by all.

- Failure to risk assess new or changed activities or equipment, or failure to act on the findings of risk assessments.
- Mixed messages (actions and behaviour contradict verbal commitment to safety).
- Lack of procedures, or procedures not implemented, maintained or followed.
- Equipment not maintained adequately due to lack of time, resources or management oversight.
- Previous near-misses not reported as not seen as important.
- Blame culture leading to investigations focusing on the fault of people instead of root causes, or individuals attempting to avoid blame by hiding mistakes.
- Poor communication or working relationships between departments or between client and contractors.
- Lack of training.



### *An example of a root cause analysis*

### **Latent and Active Failures: Reason's Swiss Cheese Model**

Common terms now used in accident investigation are 'Active' Failures and 'Latent' Failures.

#### **Active Failures**

The unsafe acts directly linked to an accident are known as active failures. Examples of active failures include human errors, mistakes and rule breaking. They usually involve front-line workers, the consequences are immediate and can often be prevented by design, training, or operating systems.

#### **Latent Failures**

Latent failures are characteristically failures in the health and safety management system such as the design, implementation, and monitoring aspects.

They contribute to accidents but can be hidden for a long period until they are triggered by an event.

This makes them equal to or a greater possible danger than active failures.

Latent failures tend to be made by non-operatives such as designers and managers.

Examples of latent failures included:

- Poor equipment/plant design.
- Inadequate supervision.
- Ineffective training.
- Insufficient resources.

### Swiss Cheese Model

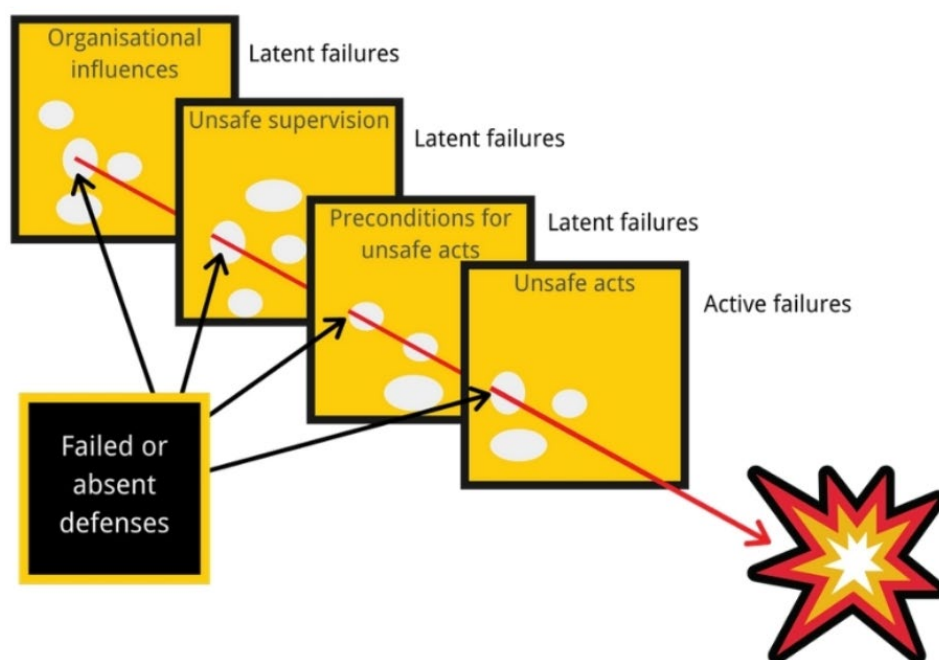
In the Swiss Cheese model below (originally put forward by James Reason in 1990 and has since gained widespread acceptance and use) Most accidents can be traced to one or more of four levels of failure:

1. Organisational influences
2. Unsafe supervision
3. Preconditions for unsafe acts
4. The unsafe acts themselves

These four levels are modelled as a series of barriers or defences against failure, represented as slices of Swiss cheese.

Individual weaknesses in each specific part of the model are represented by the holes in the slices of cheese. When the holes in each slice line up momentarily, the hazard can breach the defences causing a failure in the system i.e., an accident.

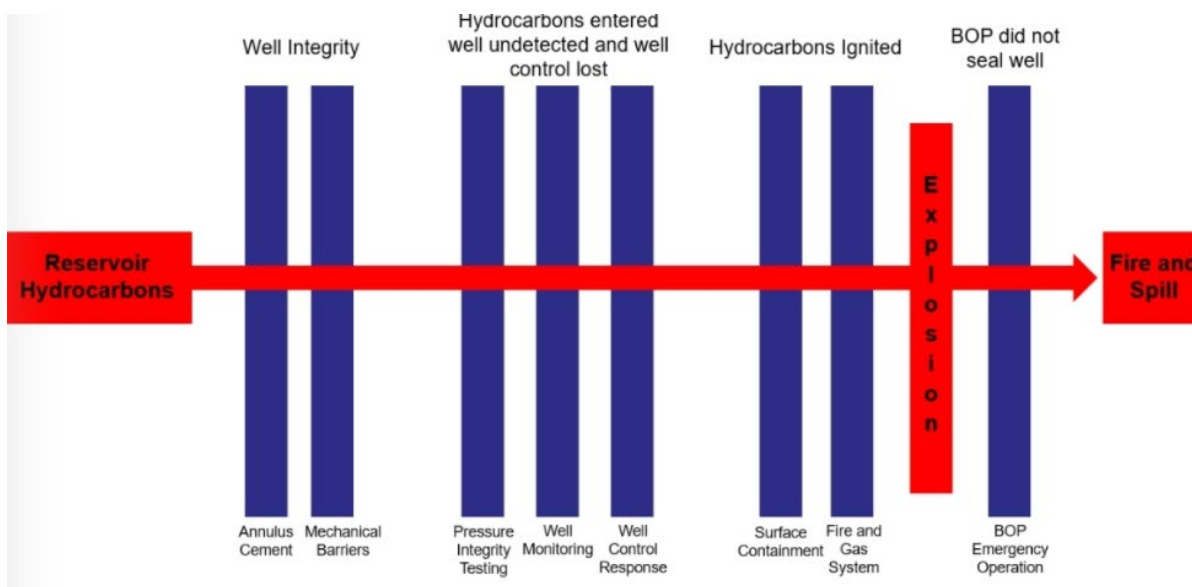
This model includes both the active and latent failures that led to the accident or error.



Swiss cheese model - James Reason

### ***The Swiss Cheese Model***

The Swiss cheese model figure below represents the failures that contributed to the Deep Water Horizon (Macondo) Incident in April 2010.



### **Fault Tree Analysis**

The ILO Code of Practice "Prevention of Major Industrial Accidents" defines Fault Tree Analysis as: "A method for representing the logical combinations of various system states which lead to a particular outcome (top event)."

Fault tree analysis is a method widely used to determine the possible failures and human errors (both in hardware and software) that could cause system level undesired events (known as top events).

The analysis begins with a top event, then attempts to determine the specific causes of the top event by constructing a fault tree. This method is known as a top-down approach.

The main purpose of the fault tree analysis is to help identify potential causes of system failures before the failures occur.

The analysis begins with a top event, then attempts to determine the specific causes of the top event by constructing a logic diagram called a fault tree. This is also known as taking a top-down approach.

It can also be used to calculate the probability of the occurrence of the top event. These calculations involve quantitative system reliability and maintainability data, including failure.

### **Rates and failure probabilities**

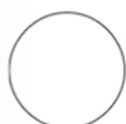
Once a Fault tree is constructed it will clearly identify those components which are less effective/reliable so that efforts can then be focussed on improving the systems' reliability and therefore safety.

### **Symbols**

The basic symbols used in a fault tree are called logic gates and events and are similar to the symbols used by electronic circuit designers. Several examples of gates and events are shown in the figure below. The two main and simplest gates are the 'AND' and 'OR' gates.

## Fault Tree Diagram Symbols

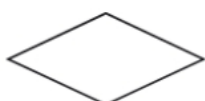
### Events



Basic event



Conditioning event



Undeveloped event



External event



Intermediate event

### Gates



AND



OR



Exclusive OR



Priority AND

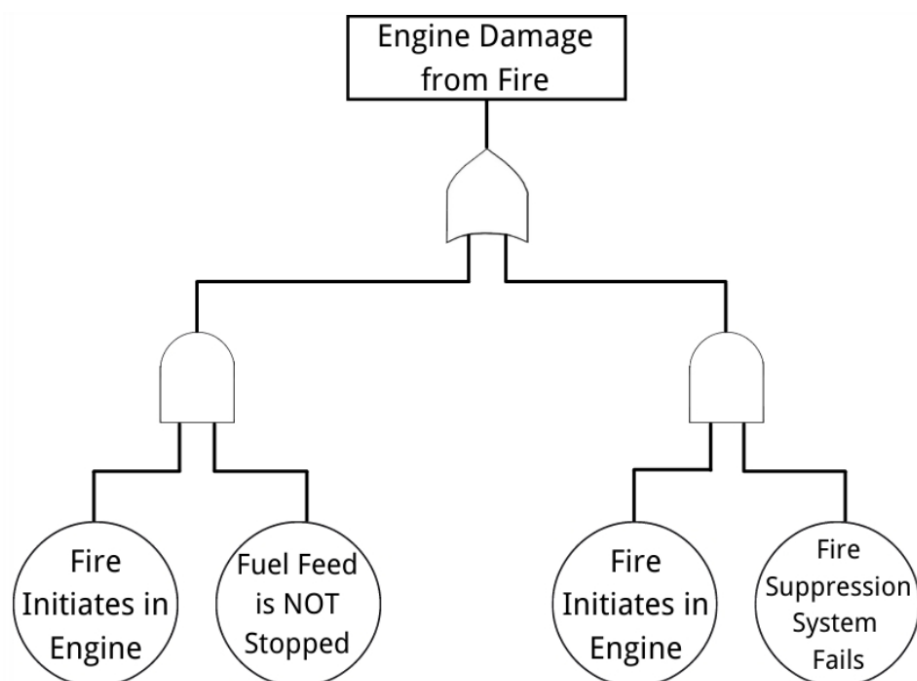


Inhibit

### Transfers



In the simple example below, the top event is a fire damaging an engine. This can be caused by either of two basic events: a fire developing in the engine, in combination with either a failure of the fire suppression system or the fuel feed continuing to supply fuel to the fire.





### *An example of a basic fault tree*

## **Event Tree Analysis**

ETA focuses on the consequential events which flow from the initiating (or 'Top') event. It considers the possibility of both the success and failure of the safety controls designed to prevent or mitigate an escalation of the accident sequence.

**Five** steps are involved in an ETA:

### **1. Identify the initiating (or Top) event**

For example: "release of toxic or flammable gas", " fire or explosion", " release of hydrocarbon to sea".

### **2. Identify the safety functions or controls designed to deal with the initiating event**

The safety functions can be thought of as the organisation's defence against the occurrence of the initiating event, and might include:

- Safety systems (such as gas or fire detection systems) that automatically respond to the top event
- Alarms that alert the operators when the initiating event occurs
- Operator actions

### **3. Construct the Event Tree, starting from the initiating event and proceeding through the success and failures of the safety functions**

There are a lot of ways to construct an event tree. They typically use binary logic gates, i.e., a gate that has only two options such as success or failure, yes or no, and on or off.

The initiating event starts on the left-hand side with the tree branching progressively to the right. As well as the logic gates the event tree includes nodes which are the branching points.

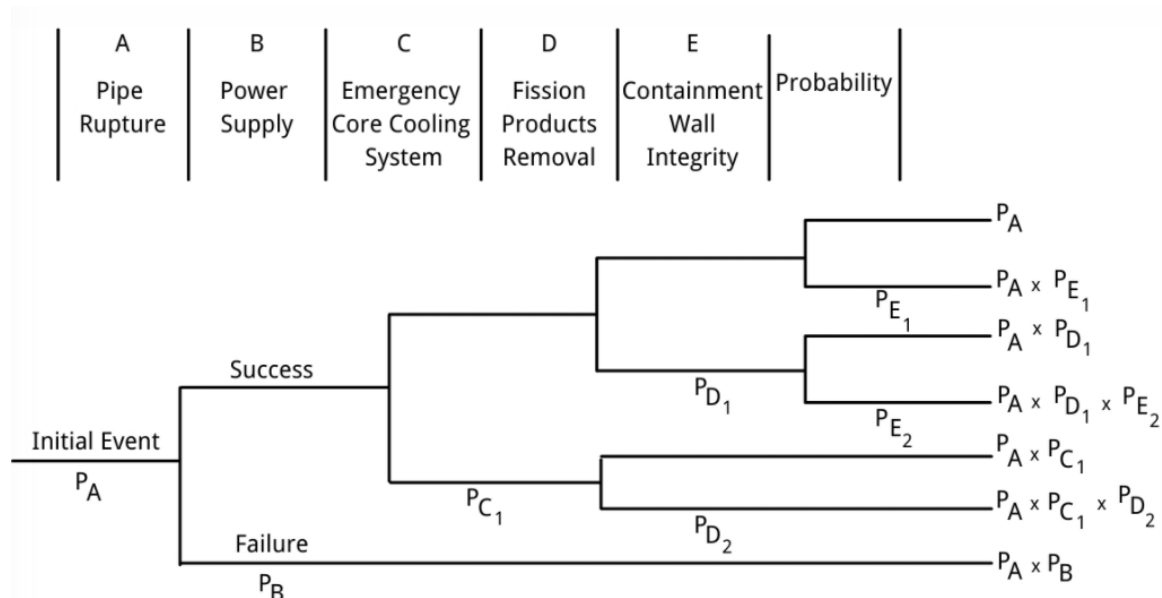
### **4. Establish the resulting accident event sequences**

The accident event sequences represent a multitude of incidents that can result from the initiating event. One or more of the sequences may represent back to normal safe operation. Some may represent a controlled shutdown and others may result in an accident.

### **5. Identify the critical failures that need to be addressed**

Calculating the probability of the various outcomes allows the analyst to identify those safety functions which are less reliable and are weak links in the safety systems. These can then be prioritised for improvement.

The following diagram is an example of how an event tree can be drawn:



**Example of an event tree**

## The Bowtie Model

The Bowtie model was funded and adopted by Shell to meet the requirements for risk assessment, whilst integrating the understanding of how accidents happen.

This model combines both the quantitative fault tree and event tree concepts.

The left-hand side of the bowtie describes how events and circumstances can release a hazard which, dependent upon the effectiveness of the systems and activities in place (active controls and barriers), can lead to an undesired event (the Top Event), with the potential for harm to people, assets, or the environment. The right-hand side represents the scenarios that may develop from the undesired event (the Consequences), dependent upon the effectiveness of the systems and activities (reactive controls and barriers) designed to mitigate the consequences.

To prevent hazards causing the top event, active barriers are put in place, and reactive barriers are used to reduce the consequences.

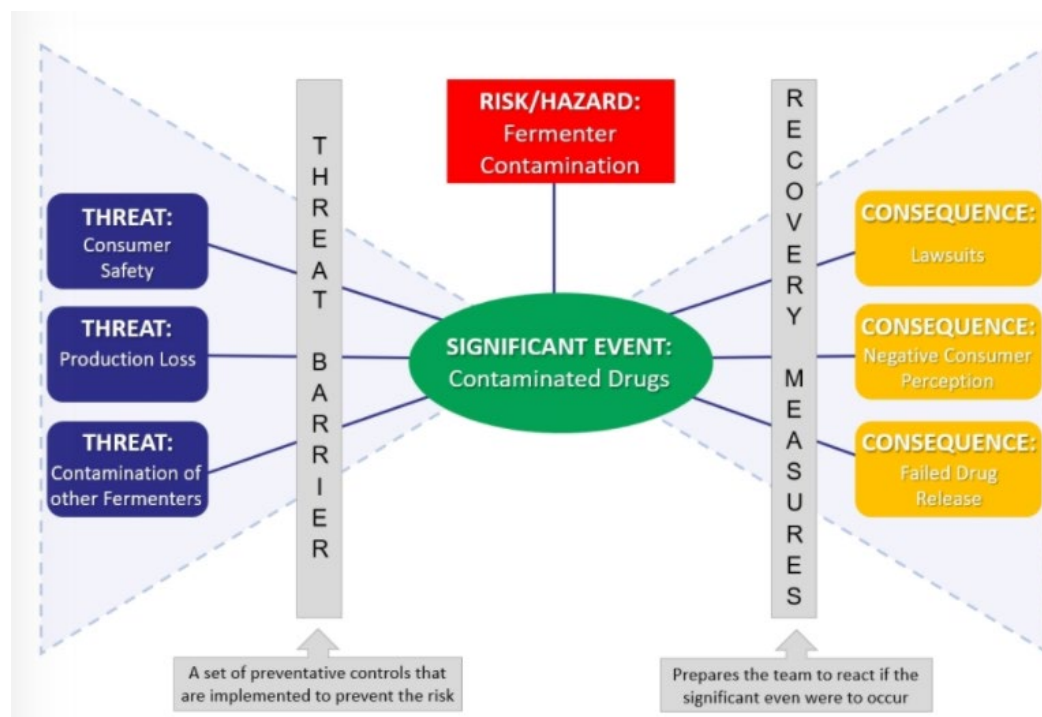
Each barrier relies on one or more activities carried out by an organisation, such as design engineering or operations, to ensure its presence and effectiveness. Barriers can be 'hard' (in other words physical controls, such as fire-resistant walls) or 'soft' (non-physical controls, such as procedures and individual competence).

The Bowtie is a structured way of looking at how hazards are managed and how consequences are prevented. It forms a basis, not only for risk assessment, but also for incident analysis and even audits.

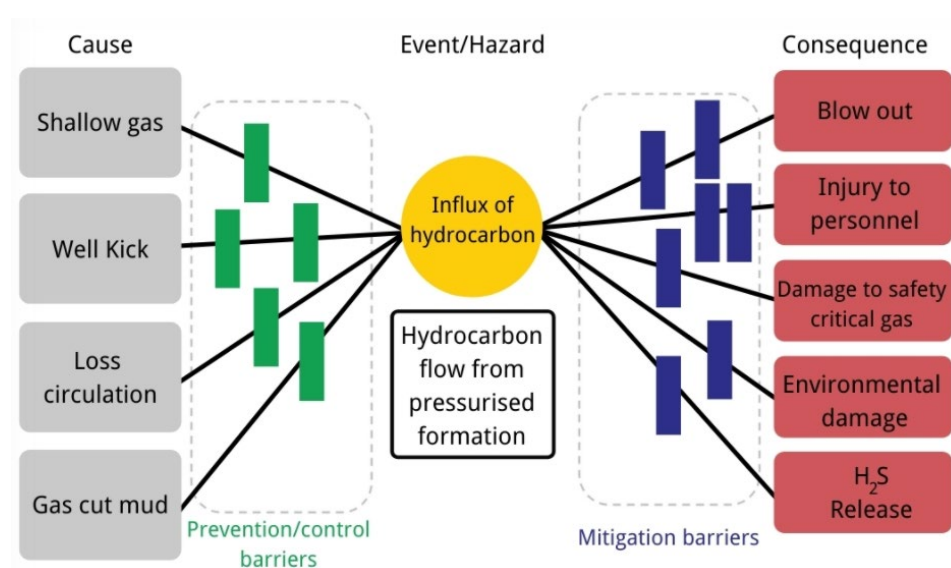
When incidents do occur, the bowtie provides a structure for analysis that leads directly to failed barriers. Also, the system can be audited using the same structure: are the barriers in place and is the system providing the necessary support?

Bowties have the advantage of being a clear graphical representation of what can sometimes be complex safety systems. In addition, they show clear links to safety and management systems.

The two Bowtie examples below illustrate the general principle, without providing any real detail of the barriers.



#### *A bowtie related to the pharmaceutical sector*



#### *An example of a petrochemical bowtie*

## Fishbone diagrams

The concept of “cause and effect” analysis was first devised by Professor Kaoru Ishikawa in the 1960’s. It was published in his 1990 book “Introduction to Quality Control”.

Because the diagrams created resemble the skeleton of a fish, they are known as “Fishbone” diagrams (or Ishikawa diagrams).

Fishbone diagrams are a visual means of looking at cause and effect. It is a more structured approach than other tools that are used for brainstorming the causes of a problem (for example, the “Five Whys” approach).

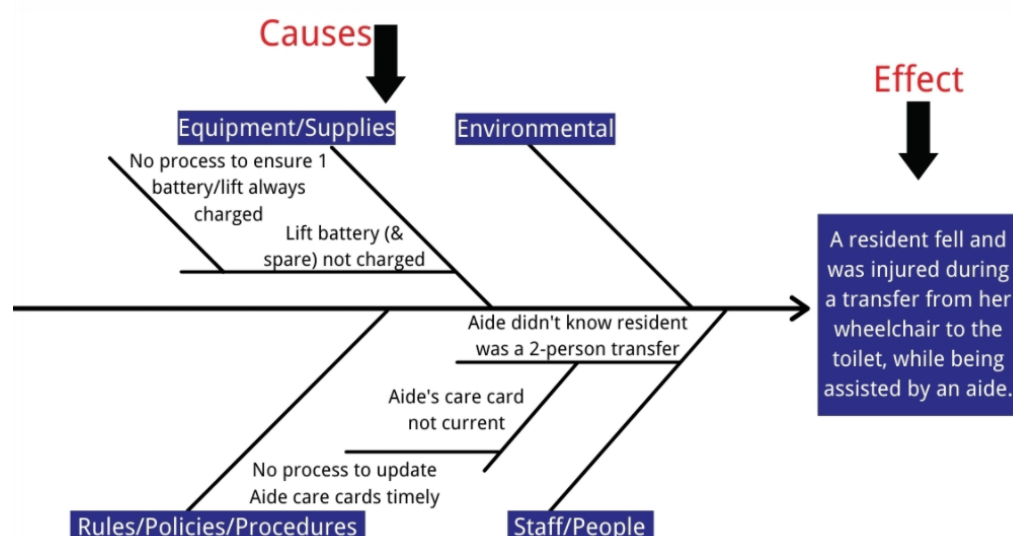
The effect, or problem, (for example, an incident) is shown at the head of the fish. Possible contributing causes are listed on the smaller “bones” under a range of cause categories.

The value of using the fishbone diagram is to enable an investigation to dig deeper, to go beyond the initial incident report, to better understand what in an organisation’s systems and processes are causing the problem. In other words, to determine root causes.

The steps used in a fishbone analysis are:

1. Agree on the **problem** statement (for example, the effects on an accident). Write this at the head of the “fish.” The effect should be stated clearly and specifically.
2. Next, identify the **factors** that you consider may be part of the problem. For example, procedures, materials, equipment, people, the environment (categories).
3. Brainstorm the possible **causes** of the problem, related to each of the things identified in step 2. These appear as branches on the appropriate categories.
4. At this stage there should have a diagram showing all of the possible causes of the problem that you, or the team, can think of. **Analyse** each cause by asking the question “why does this happen”? These are written as sub-causes branches off the cause branches.

Depending on the complexity, importance and severity or potential severity of the problem, the most likely causes may be investigated further, and addressed in order to prevent future similar problems.



### Example of fishbone diagram

## 5-Whys

The 5-Whys technique was invented by Sakichi Toyoda (founder of Toyota Industries) in the 1930s. It became popular in the 70s. It is still used today by Toyota for problem solving.

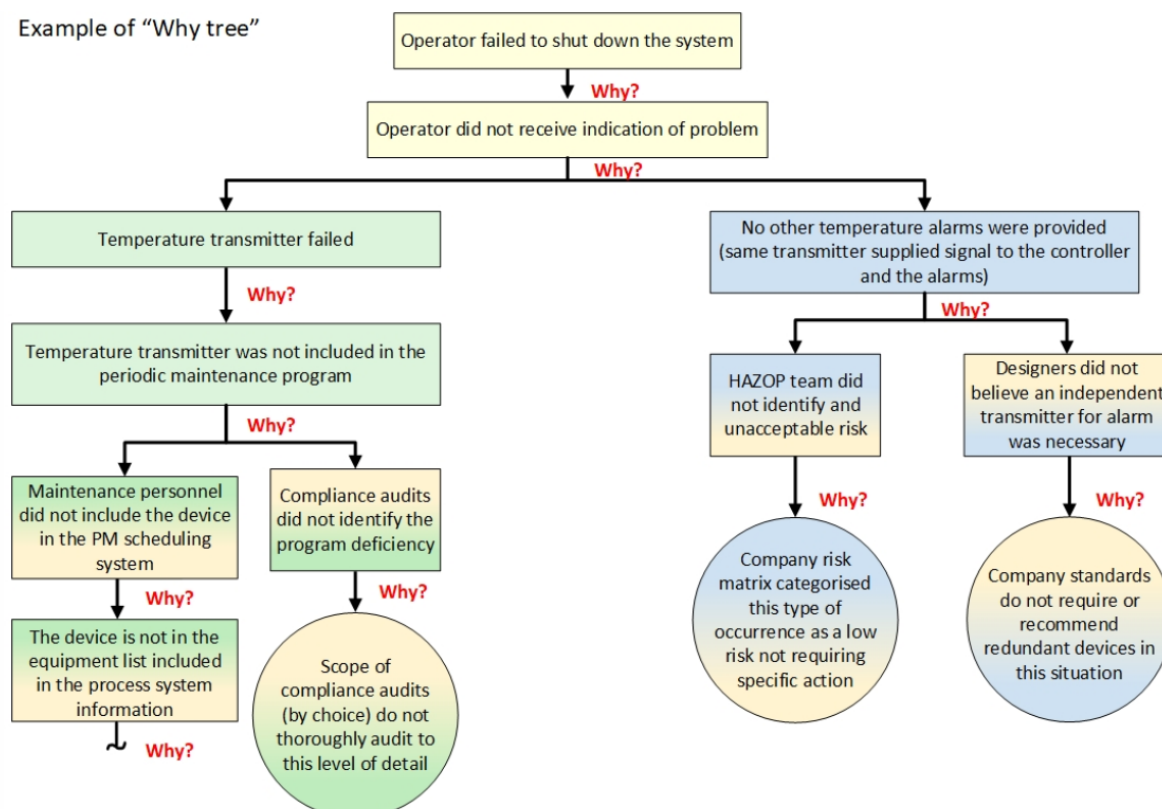
Toyota has a "go and see" philosophy. Decision making is based on an in-depth understanding of what's actually happening on the shop floor, rather than on what someone who is detached from the shop floor (in an office or a board room) thinks might be happening.

The 5 Whys technique is true to this tradition. It is most effective when the solutions to a problem come from people who have hands-on experience of the process or problem in question.

The technique is very simple. When a problem occurs (such as an accident), root causes are determined by asking "Why?" up to five times. The root cause should become apparent, and solutions can be agreed to stop the problem for recurring.

Typically, with an accident (particularly a complex one) there will inevitably be more than one immediate root causes. In such cases, the immediate causes should first be identified and the 5 Whys approach be used to identify the root causes of each of the immediate causes.

Example of "Why tree"



Example of "Why tree"

## The quantitative analysis of accident and ill-health data

### The impacts that statistics can have on an organisation and organisational reputation

It can take years for an organisation to build a brand and healthy reputation – but only a very short time for it to be severely damaged or destroyed.

Although putting a monetary value on reputation is difficult, reputation is arguably an organisations most precious commodity – and something that cannot be covered by an insurance policy.

“Reputation risk” means identifying health and safety risks and putting systems in place to manage those risks. A serious workplace accident is the classic example.

In January 2017 car giant Volvo was prosecuted, which resulted in a £900,000 fine after a worker was seriously injured falling from a stepladder.

Nearly a decade previously, Volvo said it wanted to see zero deaths from its cars in 2020. As 2020 drew nearer, Volvo amended that to an even more ambitious goal: “Our vision is that by 2020 no one should be killed or seriously injured in a new Volvo car”.

Reputational damage arising from an accident can be even greater if a company brand is associated with safety.

**Methods of calculating loss rates from raw data: accident/incident frequency rate, accident incidence rate, accident severity rate, ill-health prevalence rate**

In the following sections we will discuss:

- Methods of calculating loss rates from raw data:
  - Accident and incident frequency rate.
  - Accident incidence rate.
  - Accident severity rate.
  - Ill-health prevalence rate.
- The principles of statistical variability, validity and use of distributions (i.e., importance of representative samples, sampling a population, errors in data).

**Methods of Calculating Injury Rates from Raw Data**

By analysing accident and ill-health data, we can determine trends. These trends permit us to focus on the key areas for action. We can use the data to compare organisational trends with national trends or compare these with other organisations in a similar industry and of a similar size. In doing so we must ensure that we are comparing "like for like" because not all organisations or countries use the same formulae. For example, the frequency rate multiplier used by the ILO is 1,000,000 whilst the USA uses 200,000.

It is important to remember that the only purpose of the multiplier is to create a small useable number. It serves no other purpose. When comparing two or more accident rates, you must ensure the multipliers used were the same. Or else the rates cannot be compared.

Two widely used methods are 'accident frequency rate' and 'accident incidence rate'. Both types of rate help compare health and safety performance between similar organisations or departments.

The two approaches do this in slightly different ways. In the UK, published HSE injury rates give the number of people injured over a year in a group of 100,000 workers. This approach does not consider the number of hours worked. The 'accident frequency rate' is the number of people injured over a year for each million hours worked by a group of employees or workers.

Which approach is right? If there are big differences in the hours worked by the groups being compared, or if the hours worked change significantly over time, then frequency rates are better. If not, then incidence rates are easier to calculate and are not affected by uncertainties in the estimates of hours worked.

The following formulae are standards for the health and safety industry. For exam purposes you could be asked to do some calculations of accident rates, so you do need to be very familiar with these formulae.

### **Accident and Incident Frequency Rate**

Frequency rates are the accident and incident rates compared with time, and is calculated as:

$$\text{(Total number of accidents / Total number of man hours worked)} \times 1,000,000$$

The multiplier of 1,000,000 is favoured by the ILO, UK, and Japan, whilst OSHA in the USA favours 200,000. Some organisations use 100,000. Please remember, the multiplier is only important when attempting to compare different rates.

Considering the number of hours worked, rather than the total number of workers, avoids the problems of part-time workers giving a distorted rate (as it does in the incidence rate calculation).

### **Accident and Incident Incidence Rate**

Incidence rates are the rate of accidents an organisation has over a period of time. Calculated as:

$$\text{(Total number of accidents / Average number of persons employed)} \times 100,000$$

The UK calculates incident rates using a multiplier of 100,000 as above. Japan uses a multiplier of 1,000. Organisations tend to use the smaller multiplier, 1000.

### **Accident and Incident Severity Rate**

Provides data on the average days lost due to accidents in relation to the number of hours worked in a period of time. Calculated as:

$$\text{(Total number of days lost / Total number of man hours worked in the period)} \times 1,000$$

The figure may be affected by several factors, including how inclined workers are to take time off after an injury. Additionally, a fatality is not reflected in a severity rate calculation.

### **Mean Duration Rate**

This simply calculates the average days lost per accident in a period of time:

$$\text{Total number of days lost / Total number of accidents}$$

### **Ill-Health Prevalence Rate**

The UK Labour Force Survey (LFS) gives estimates of the number of people who have conditions which they think have been caused or made worse by work (regardless of whether they have been seen by doctors).

The estimated prevalence is the estimated number of people with a work-related illness at any time during the 12-month reference period. It includes the full range of illnesses from long standing to new cases. The prevalence rate is defined as the prevalence estimate divided by the population at risk of having a work-related illness.



Prevalence rate can be calculated as:

**(Number of people with work related illness over 12 months / Average number of people employed) x 1,000**

### **Limitations of Accident and Incident Rates**

Organisations may have different definitions of what constitutes an accident. For example, some may only count 'Lost-Time Accidents' (also called LTA), whilst others may focus on all accidents, including damage only accidents. Even the definition of an LTA can vary. Some organisations will classify an accident as an LTA if the worker is unable to finish their shift. Others may decide that it is an LTA only if the worker cannot return the following day, or if they are put onto "light duties". These different definitions can cause significant distortions when comparing rates.

It can be difficult to calculate the average number of workers during a period of time. Absence due to sickness, the use of agency workers, and contractors, can all affect the calculation. Part-time workers will count as one worker, even though they do not work the same number of hours. It is also difficult to calculate the total number of hours worked, especially where a project varies in workload, or where there are part-time employees. Organisations will have to decide whether to include contractors in their calculations. If so, then they must ensure that contractors report incidents to the client, and this does not always happen consistently.

Levels of reporting may vary widely between departments and organisations. An organisation may have very low accident rates, but this may only reflect a very low level of reporting. This is even more of a problem where organisations have targets and incentives for accident reduction because this creates an incentive for workers to not report accidents.

In some organisations, workers may have a greater propensity to take time off work after an accident. In other organisations, workers may continue to work despite pain and discomfort. This is often due to the financial consequences of not working. Organisations that offer a sick pay scheme, or who are more tolerant of absence from work, will often have a higher accident severity rate, because the days lost can be higher. In others, there may be a culture of coming to work regardless of how the worker feels.

Ill-health prevalence rates can be affected by lower levels of awareness and reporting of what constitutes work-related ill-health. Ill-health conditions are often not reported because the worker does not realise it is work-related or that they need to report it. In some cases, the ill-health condition will only be identified when the worker returns to work and completes a 'Return to Work Interview' with their manager. The findings of the interview can be communicated to the Human Resources Department, but they do not always report the ill-health condition to the Health and Safety Department, believing it to be a confidential medical problem.

## **Principles of Statistical Variability and Validity**

### **Introduction**

Statistics involve the collection and interpretation of data. We must therefore first know how to understand, display, and summarise large amounts of quantitative information, before undertaking a more sophisticated analysis. Statistical analysis of quantitative data is not only important throughout the pure and social sciences and life in general, but also when analysing health and safety issues.

### **General Principles and Terminology**

In probability and statistics, a '*random variable*' is a quantity whose value depends on a set of possible random events. For example, the failure of a sensor could be a random variable.

The 'outcome' is the result of an experiment, so for example if a coin were tossed and landed on its tail side, the outcome of the experiment (the toss) would be heads.

A particular 'outcome' is also an '*observation*'.

'Data' are a collection of 'observations'.

The collection of all possible outcomes is called the '*population*'.

In most instances, it is not possible to be able to survey/observe an entire population, therefore a sample is used. For the sample to be unbiased it must be random, where everyone is equally likely to be selected for inclusion. For example, if we are interested in conducting a survey of the amount of physical exercise undertaken by the general public, surveying people entering and leaving a gym would provide a biased sample of the population, because many people in the general population do not exercise in gyms.

Variables fall into one of two categories - qualitative or quantitative.

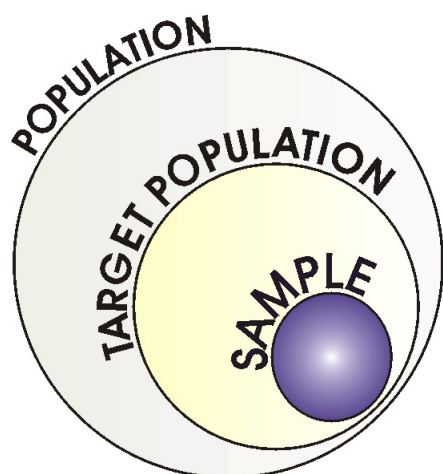
Qualitative variables do not have numeric outcomes and can include gender, type of house.

Quantitative variables have outcomes which are numeric such as race times, age, height.

### Definitions:

**Target population:** A target population is the group that is the focus for the research/study - the group the conclusions will be made upon.

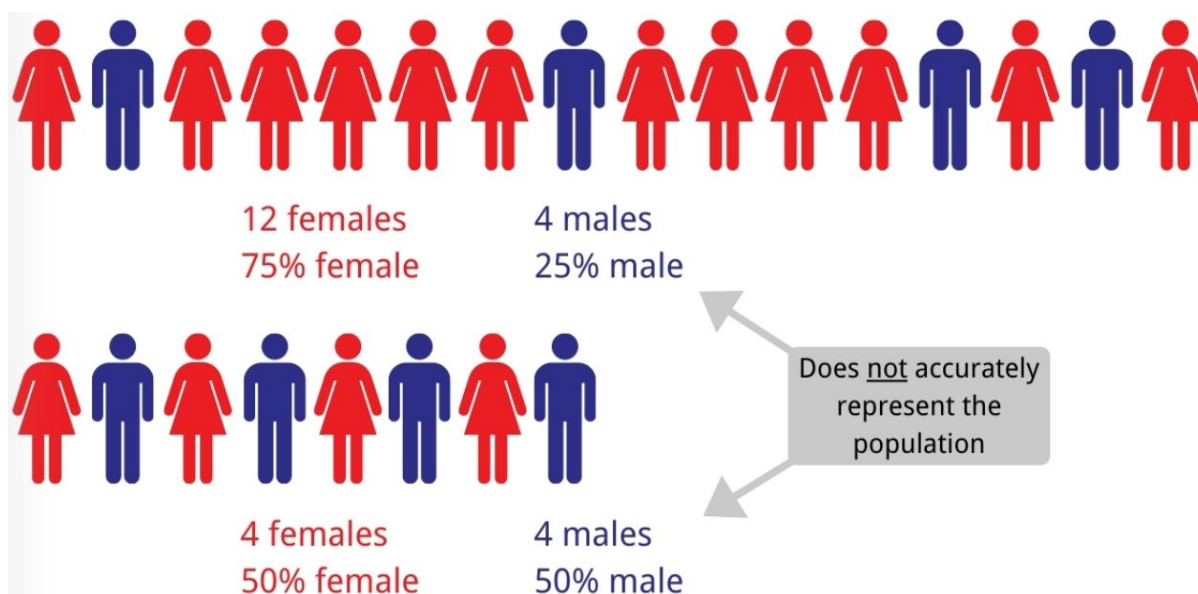
**Sample:** A sample is a proportion selected as a representation of the target population, when the target population is too large. The conclusions reached about the sample group are hoped to be mirrored/valid for the target population.



### *Population, Target Population, and Sample illustrated*

**Random Sample:** This is a sample of the target population selected randomly in which all members of the target population are equally likely to be included.

**Representative Sample:** According to Austin Research a representative sample should, as far as possible, be representative of the target population. To be representative, the characteristics (demographic, attitudinal, and behavioural) of the people interviewed should, as far as is possible, match those of the entire target population. Representative samples are important because they ensure that all relevant types of people are included in the sample and that the right mix of people are interviewed. If your sample is not representative it will be subject to bias. Certain groups may be over-represented, and their opinions magnified while others may be under-represented.



#### **Example of a non-representative sample**

#### **Sampling Variability**

Sampling variability refers to the different values which a given function of the data takes when it is compared with two or more samples drawn from the same population. For example: the condition of same model of car purchased on the same date, after a year.

#### **Sample Validity**

When you are determining the statistical validity of your data, there are four criteria to consider:

- Population: The reach or total number of people to whom you want to apply the data.
- Probability or percentage: The percentage of people you expect to respond to your survey or campaign.
- Confidence - how confident you are in the accuracy of the data. Can be expressed as a percentage or probability e.g., 90% or 0.90.
- Margin of error: this is the +/- % value that is acceptable for potential errors. It allows assumptions to be made on the population as a whole. For example, if 25% of participants selected an answer and there is +/- 5% margin of error, it can be assumed that 20-30% of the entire population would select the same answer.

#### **Errors in Data**

There are two types of errors in data: random and systematic.

When undertaking experiments unknown and unpredictable changes can occur which result in random errors.

Random errors limit the precision of the measurements but can be identified by repeating the measurements. Precision is determined by the closeness of the measurements to each other so if you do 10 tests and 9 results show similar outcomes, but one shows a completely different outcome - this can be classed as a random error.

Systematic errors are based around the measuring equipment/instruments being wither faulty or misused.

The misuse of equipment could include:

- The incorrect placing of radiometers in shaded areas when measuring solar radiation.
- Too great a distance between a substance and the thermometer leading to temperature measurement errors.

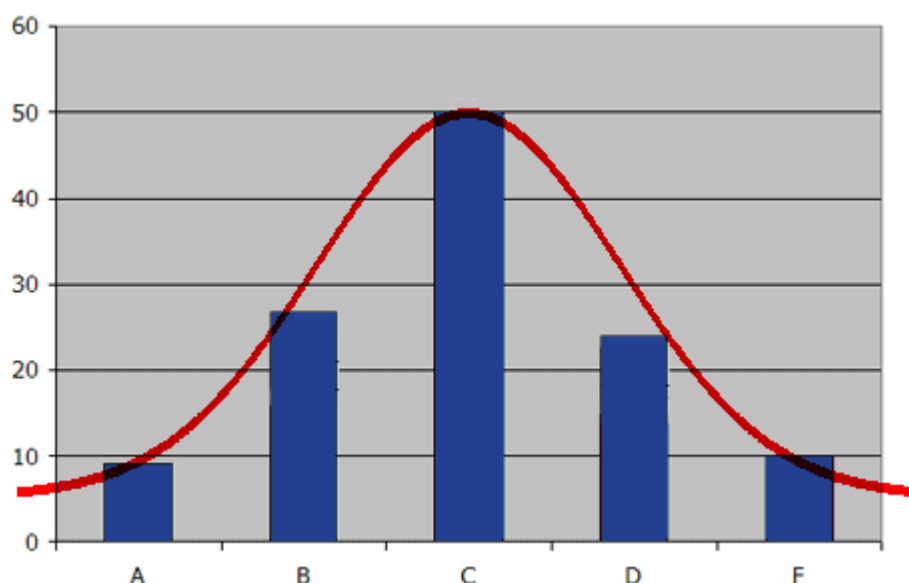
## The Use of Distributions

According to Deborah J. Rumsey author of Statistics for Dummies - 2<sup>nd</sup> Edition:

"The distribution of a statistical data set (or a population) is a listing or function showing all the possible values (or intervals) of the data and how often they occur. When a distribution of categorical data is organized, you see the number or percentage of individuals in each group. When a distribution of numerical data is organized, they are often ordered from smallest to largest, broken into reasonably sized groups (if appropriate), and then put into graphs and charts to examine the shape, centre, and amount of variability in the data."

By compiling this data, we can see the spread of the results, and begin to predict the probability of certain events occurring or which event is most common.

Below is one of the most common distributions, a normal distribution also referred to as the "bell curve" or "bell-shaped curve". This shows the number of grades received by students in an American college. It is known as a bell curve because it looks like a bell.



### Example of a bell curve

As you can see, the most students received a C grade. The bell curve shows the most common result in the centre, with the least probable results at the edges.

Whilst data and distribution models like this do not enable us to predict the future exactly, we can make predictions of a certain level of confidence. We can calculate this level of confidence and this is called a 'confidence interval'.

The confidence interval will be different from sample to sample and depends on the size of the sample and the size of variations within the data.

The confidence level or precision of sample estimates is dictated by the amount of information gathered, which is dependent on the size of the sample. There are always levels of uncertainty with all estimates which is based on not only the sample size but the variability of the data.

Estimates will have a greater level of uncertainty with a more variable population but would reduce if the information were gathered from a larger sample.

For example, if estimates are needed on the number of people who own a Toyota in the UK, 100 people can be sampled and asked.

If 25 out of the 100 people own a Toyota, estimates can be made that 25% (25/100) of people in the UK own a Toyota.

The margin of error and confidence interval can then be created using these statistical calculations.

However, a sample of 100 people is a very small sample. As our sample size increases, the confidence in our estimate increases, our uncertainty decreases, and we have greater precision. If we increase our sample size to 10,000 adults, we might find that 6,668 people own smartphones, or 66%.

The size of the sample can greatly affect our confidence in making estimates based on the data. On the other hand, the larger the sample the more time and money it costs to collect the data.

## 5.2: The purpose and use of health and safety performance measurement

### The meaning of key performance indicators and their role in setting business objectives

A key performance indicator (KPI) can be defined as:

*"a measurable value that demonstrates how effectively a company is achieving key business objectives. Organizations use KPIs at multiple levels to evaluate their success at reaching targets. High-level KPIs may focus on the overall performance of the enterprise, while low-level KPIs may focus on processes in departments".*

(Source: <https://www.klipfolio.com/resources/articles/what-is-a-key-performance-indicator>)

Performance measurement is the process of collecting, analysing and/or reporting information regarding the performance of an individual, group, organisation, system, or component.

Measurement information monitors how the health and safety management system operates. It is used as a tool to develop and improve by:

- Providing information on how the system is implemented in practical terms
- Identifying areas where improvement is required
- Providing data that can be used as feedback and motivation

There is no single, reliable measure of health and safety performance. A variety of performance measures are needed to assess the full range of health and safety activities.

Peter Drucker said, *"You can't manage what you can't measure."*

*"If you don't know where you are going, chances are you will end up somewhere else",* said Yogi Berra.

Measuring performance is an essential part of a health and safety management system. It should be as important as the financial, production or service delivery management. We all measure performance every day in our own personal lives, whether it be checking our bank account, the school results of our children, or whether we have finished our job on time and to a high level of quality.

Providing information on the progress and current status of management strategies, systems, processes and activities of an organisation to control risks to health and safety is the main purpose of measuring health and safety performance. To be effective the information must give insight into what level of performance is being achieved, why the performance is at the current level, and how it can be improved.



Health and safety performance measurement should give information on the following key areas:

- Where performance is in relation to overall health and safety aims and objectives
- Reasons why the organisation may not be achieving the targets and objectives
- How hazards and risks are controlled
- Comparisons with other similar organisations
- Whether there has been an improvement or decline in performance
- Effectiveness of health and safety management - i.e., whether current practices are working
- Monitoring whether current management of health and safety is proportionate to the hazards and risks within the organisation
- Information on whether health and safety are managed across all of the organisation or just in certain areas

## Targets and Objectives

Both types of KPI are needed for an organisation to set objectives and targets to improve their health and safety performance. Therefore, the organisation will set a target or an objective to reach a certain level of performance.

For example, a lagging KPI could be the number of accidents. The organisation could set itself an objective of reducing accidents from their current average of 18 per month, to less than 10 each month. Therefore, the lagging KPI target could be a "maximum of 10 accidents each month".

Another objective could be to motivate managers to carry out their workplace safety inspections more regularly. So, there could be a leading KPI target to ensure 95% of workplace inspections are completed on time and managers would be held accountable for hitting their individual target. The organisation would track their performance against these KPIs. If the organisation is struggling to reach their KPIs then they will investigate why and identify corrective measures to improve performance.

## Alignment of Objectives, Targets, and KPIs

One of the key outputs of the health and safety planning process is plans and objectives to develop, maintain and improve the health and safety management system. The various plans and objectives across the different parts of an organisation need to be aligned to meet the organisation's overall aims and to provide a coherent approach to effective risk control. The objectives and targets of each department must not conflict with each other. For example, a production target must not conflict with a quality or safety target. Organisational goals and targets should be cascaded through all levels of the hierarchy and linked in order to create a synergetic management system to achieve the main aims.

## S.M.A.R.T. Objectives

Objectives should be "SMART", that is:

- **Specific.** Specific in what they need to achieve
- **Measurable.** In a format that can be monitored to indicate when they have been achieved
- **Achievable.** Within reach, attainable. People are demotivated by unachievable targets, and often they will not even try to reach them
- **Realistic.** Achievable with the available resources, in the required timeframes
- **Time-based.** A specific time limit must be imposed. Without a deadline, there is no incentive to act now

Performance measurement helps to determine if the objectives are having the desired effect and should identify if they are, or are about to be, completed on a timely basis. For example: if an objective was "to ensure that all



managers have attended a NEBOSH general certificate course by the end of the year" and, on review six months into the year, only 10% have attended, action may need to be taken to "speed up" the training process).

Similarly, performance measurement can also help to determine the appropriateness of control measures. For example, if adjustable Perspex/Plastic guards are used on a pedestal drill, inspections and employee feedback may suggest that guards are often taken off because visibility is often impaired, and the guards slow the process down. Telescopic trip devices may be a better option. This would improve safety without affecting performance.

### **Types of and Benefits of Leading and Lagging Indicators**

The performance indicators most frequently used, such as loss time incidents (LTIs) or sickness absence, reflect health and safety performance in the past. These are called 'lagging' indicators because the information, "lags" behind - it is historical. In other words, they have already occurred.

Outcomes of the past management process rather than the current condition of the present management process is measured here and can identify the failures of the management process.

There is little value with this type of indicator other than enabling the organisation to learn from past errors. It is more effective to use information with greater predictive value, such as leading indicators. However, they can demonstrate levels of improvement.

The alternatives for lagging indicators are leading indicators. These provide feedback on performance before a problem arises so that action can be taken to prevent it. Unfortunately, there are few generally accepted and standardised health and safety leading indicators. This is due to the complexity of health and safety, and the uniqueness of many workplaces and management systems.

### **Leading indicators**

Leading indicators have predictive value and can therefore be used to improve health and safety management in general, or to intervene in risky situations before an incident occurs. Often, they measure factors that are generally regarded as essential elements of good health and safety management.

Examples of leading indicators are:

- The number of managers who have completed suitable health and safety training
- Percentage of workers with adequate training
- Percentage of management meetings that had health and safety on the agenda
- Percentage of management-worker meetings which discuss health and safety
- Number of management visits to the shop floor where health and safety is addressed
- Percentage of business partners (suppliers, contractors, etc.) evaluated and selected on the basis of their safety performance
- Number of workplace inspections carried out in a period
- Frequency of (observed) (un)safe behaviour
- Number of health and safety audits performed
- Percentage of safety-related actions and activities that are finished on time
- Percentage of suggestions or complaints where feedback is given to those reporting within two weeks
- Percentage of pre-use inspections carried out on equipment
- Safety climate (survey)

As the examples show, leading indicators tend to focus on the positive rather than the negative. They focus primarily on actions undertaken to prevent incidents. KPI's can be regarded as positive or negative depending on how they are defined or what they are used for. For example, a high number of reported dangerous situations can be regarded as negative if there are too many dangerous situations. It can also be positive in that employees are motivated to report dangerous situations.

When done correctly, there is a strong link between high numbers of leading and proactive activities and a decrease in incidents and ill-health.

Leading indicators are only effective if they are used by the management team to identify and introduce improvements to the health and safety management system, by means of an action plan and by allocating sufficient resources.

### **Lagging Indicators**

Even though lagging indicators do not, by themselves, allow an accurate assessment of current performance, they are still frequently used in organisations. Choices can be made as to whether to express the KPIs in terms of percentages, rates, or absolute numbers. The most important health and safety lagging indicators are:

- Injuries and work-related ill health in terms of LTIs. This could involve a calculation of the Lost Time Incident Frequency Rate or similar calculation.
- A record of days lost through sickness absence (% of total workdays lost by sickness absence).
- Incidents or near misses.
- Complaints about work that is carried out in unsafe or unhealthy conditions.

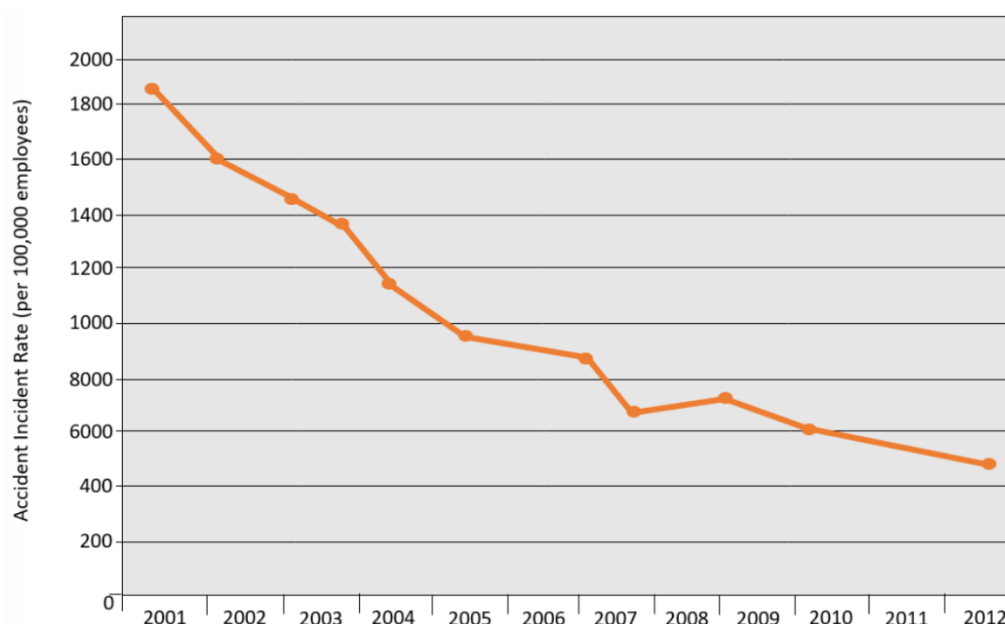
As shown above, there is often a strong emphasis on the negative, i.e., on measuring what went wrong. However, most people and organisations tend to prefer positive feedback. Then the focus is on what went well (what was safe and healthy) and according to plan.

Examples of positive lagging indicators are:

- The percentage of completed productive planned workdays (i.e., 95% productive workdays as opposed to 5% sickness absence).
- The number of hours worked (by the total work force) without lost time injury.
- The number of working days since the last accident.
- The percentage of employees without early signs of ill-health (identified through health surveillance).
- Employee satisfaction (survey).

The limitation of lagging indicators is that they tell you how many reports of injury or ill-health there have been, but they do not tell you how well the organisation is at preventing incidents.

Their main benefit is that they allow you to see a trend of past improvement or deterioration over time.



***Example of a trend of decreasing numbers of accidents***

### **The assessment of the effectiveness and appropriateness of health and safety objectives and arrangements, including control measures**

The objectives are steps that are taken to achieve an overall aim. There may be occasions when objectives are not "SMART", or they do not help to fulfil the overall aim of an organisation.

Performance measurement should include an assessment of the effectiveness and appropriateness of objectives and to ensure that arrangements are suitable, sufficient and achieve the original purpose. This will help to confirm that the objectives are focusing on the correct areas, and that the arrangements to manage health and safety are appropriate and working effectively.

Some objectives may be inappropriate. It is the measurement of progress against objectives and KPIs that will show if this is the case. For example, an organisation may believe that it is the lack of up-to-date risk assessments which is the root cause of their high rate of accidents. If by quickly updating the risk assessments, there is little or no impact on the accident rate then this may be the issue. The organisation can then determine whether it is the supervision of managers that is lacking, or the controls in the risk assessments are not being implemented or used. Therefore, the organisation could change its objective to focus on providing effective supervision.

It may be found that objectives require more resources, in terms of people time, finances, or expertise, than is available. Therefore, the objective cannot be achieved in the agreed timeframe. Further steps may need to be incorporated here or the objective may need to be completely re-structured.

Performance measurement can determine if the current health and safety arrangements are effective and appropriate. Monitoring of the amount of a solvent in the atmosphere may show that people are being exposed to high levels. This would suggest that existing controls to prevent exposure are not effective. It could be due to the extraction ventilation not working effectively, or workers are not closing the containers of chemicals after use. It is important to determine what the cause of the problem is in order to rectify the matter.



### ***Aims and objectives***

#### **Making recommendations, based on performance, for the review of current health and safety management systems**

Organisations should plan to learn from their experiences and take opportunities to improve performance. One of the purposes of measuring performance is to review the performance, learn lessons, and make recommendations to improve the current health and safety management system. This is a part of the continual improvement process.

Performance measurement will generate a large amount of data, especially if both active and reactive measures are used. When reviewed, this will help the organisation understand whether their management system is achieving the desired goals. It may be necessary to change the health and safety policy, to modify people's roles and responsibilities, or to allocate or prioritise resources differently.



### **Case Study**

A pharmaceutical manufacturer had been experiencing a high number of lost time accidents for the last 2 years. During the management review of performance, it was found that a common root cause for these incidents was a lack of clarity over the role of line-managers and health and safety representatives. The line-managers believed the representatives were responsible for supervising safe working practices. The representatives were full-time workers and did not have the time to supervise anything except their own work. There was a lack of communication between the two groups.

The organisation updated its health and safety policy to make it very clear that supervision of health and safety standards is a line-manager responsibility. This was communicated to all managers, and their teams (including the representatives). The managers were then sent on an IOSH Managing Safely course, and on internal workshops to help them understand the organisation's risk assessment and inspection systems. They were then coached and assisted by the organisation's safety team for 6 months, until they were able to manage the safety of their areas themselves with very little assistance. During this process, it was found that some of the line-managers lacked the organisational and people-management skills to carry out their role effectively. This was causing other problems, such as quality defects and missed production deadlines. These managers were eventually relocated, and improved selection processes implemented for future recruitment.

The result was a significant decrease in the accident rate. The organisation decreased its minor accidents by a factor of three. And its lost time accident rate soon reached zero and stayed that way for over three years.

### **The benefits of measuring what goes right (proactive safety management)**

Instead of making it impossible for things to go wrong (as is often the case with safety I) we should focus on the things that go right and enhancing the capacities to make this the case. Benefits include:

- Improved worker morale by involving them in solutions and removing bureaucracy.
- Enhanced health safety culture in the organisation.
- Demonstrating to enforcing authorities a pro-active approach to health and safety.
- A focus on the health and safety positives rather than the negatives.

## Health and safety monitoring

### The Objectives of Active Monitoring

The objectives of active monitoring are to:

- Check that health and safety plans have been implemented.
- Monitor the extent of compliance with:
  - The organisation's systems and procedures.
  - Any relevant legal and technical standards.

Other benefits include:

- Helping to determine whether systems are effective and reliable.
- Enabling decisions to be made about improvements.
- Affirming the management's commitment to health and safety objectives.
- Reinforcing a positive health and safety culture by recognising success and positive actions.

Organisations should view active monitoring as an integral part of the role of a line-manager. As such it should take place at all levels of the organisation.

Managers should be given responsibility for the monitoring of plans, objectives, and compliance with standards for which they, and their workers, are responsible. The actual method of monitoring will depend on the situation.

The amount of effort invested in monitoring should be proportionate to the level of risk. This means that monitoring of high-risk activities and workplaces would normally be more frequent and detailed than the monitoring of low-risk situations.

### Active monitoring techniques include:

- Audits - a structured process of collecting information on the efficiency, effectiveness and reliability of a health and safety management system.
- Periodic examination of documents to check that systems promote the health and safety culture. For example, the process of appraisals, or the assessment of training records.
- Systematic workplace inspections or safety tours using checklists.
- Inspections to check safety related parts of specific machinery and plant are fitted and in good condition.
- Safety sampling.
- Safety surveys.
- Environmental sampling: measuring exposure to chemical, biological, or physical agents (e.g., noise, chemical fumes, dusts, radiation, etc.) and comparing this with legal requirements and other recognised standards.
- Behaviour sampling: measuring employees' behaviour to identify unsafe work practices that might require correction. For example, counting the number of people who wear the correct PPE.
- Benchmarking against good safety and health practices in other organisations.
- Regularly reporting on health and safety performance to senior management and the Board of Directors.

The data considered by active monitoring includes:

- How well plans and objectives have been set and the level of achievement.
- How well management and workers understand the organisational commitment to health and safety.
- The number of workers trained in health and safety.
- Effectiveness of health and safety training.
- Number of risk assessments completed as a proportion of those required.
- Extent of compliance with risk controls.
- Extent of compliance with legal requirements.
- Number and effectiveness of senior managers' safety tour.
- Number of workers' suggestions for health and safety improvements.
- Worker attitudes to risks and risk controls.
- Worker understanding of risks and risk controls.
- Frequency of health and safety audits.
- Time taken to implement health and safety audit recommendations, and other actions.
- Frequency and effectiveness of health and safety committee meetings.
- Frequency and effectiveness of health and safety worker briefings, such as toolbox talks.
- Reports from occupational hygienists, or health and safety specialists.
- Time taken to take action on complaints or suggestions.
- Health surveillance reports.
- Personal exposure sampling reports.
- Workplace exposure levels (noise, dust, fumes, etc.).
- Extent of use of personal protective equipment.

### **The Objectives of Reactive Monitoring**

The objectives of reactive monitoring are to:

- Measure the negative health and safety outcomes, such as incidents, accidents, ill-health, damage-only incidents, complaints, claims, enforcement action, etc.
- Investigate and identify the immediate and underlying causes of accidents and incidents.

Reactive monitoring provides information on what has gone wrong. It does not focus on predicting situations that might have negative consequences, as with active monitoring. The negative outcomes that are measured have already happened. As such, reactive monitoring can provide clear information on the failings of the management system that need to be corrected and insight into how similar negative situations could occur. It is important to identify, in each case, why performance was below that expected.

Trends and common features may be identified from the analysis of data. For example, when, where, why and how incidents occur. This provides an opportunity to learn and put in place improvements to the overall management system and relevant specific control measures.

### **Reactive Monitoring Techniques**

Reactive monitoring methods are deemed to be after the event, therefore, the range of reactive monitoring techniques include:

- Identification
- Reporting
- Investigation
- Collation and analysis of data and statistics

The events monitored include:

- Injury accidents. For example, those resulting in lost time (when at least one work shift is lost by a worker), minor physical injury, or those reportable to the national enforcement agency.
- Dangerous occurrences. For example, significant damage to plant, equipment, or facilities, such as a crane collapsing.
- Damage only incidents. For example, a collision between a barrier and a forklift.
- Near-misses. For example, an incident which could have injured someone, but did not.
- Ill-health. For example, carpal tunnel syndrome caused by repetitive actions.
- Sickness absence. This can include both non-work-related and work-related absence.
- Complaints by the workforce about health symptoms, or poor working conditions.
- Complaints by the public. For example, about noise or dust levels.
- Enforcement action by the national enforcement agency, or criminal prosecution.
- Civil claims for compensation submitted by workers.

## **Types of Performance Measures**

We will now distinguish between various types of performance measure.

- Active and reactive
- Objective and subjective
- Qualitative and quantitative

### **Active and Reactive**

Active measures:

- Measure towards a known performance standard. What does 'good' look like?
- Measure how 'good' performance (i.e., compliance) is against a set standard
- Focus on the positives and strengths of the system
- Measure performance before an incident occurs
- Have predictive and preventive use

Reactive measures:

- Measure failures, such as incidents, accidents, near misses, and ill-health
- Measure system failures, and non-compliance with performance standards
- They focus on weaknesses and omissions
- Can only be used after a failure has occurred
- Have no predictive use but can be utilised as preventive in identifying changes that need to be made



## Objective and Subjective

Objective performance measures are independent of the observer and do not require interpretation. These performance measurements often involve some sort of measurement (for example: an employee is either wearing safety gloves or they are not).

They are better left for repetitive jobs where a specific definitive action is required, or it isn't, and are useful for benchmarking. However, it needs to be used carefully and often to support a more subjective measure. Safety can be compromised by setting objective targets in production that result in workers competing and cutting corners in order to fulfil the standard set.

Subjective performance measures reflect the opinions, feelings, and impressions of the observer. It will require some interpretation (for example: reviewing a risk assessment and judging whether or not it is satisfactory or carrying out an audit and allocating an opinion-based level of performance). This is a performance measure often used by managers or supervisors to assess an individual's work performance. It can incorporate objective figures to support the decision taken. (for example: a staff member's performance is unsuitable as they have been late 5 times to perform a safety inspection and then the results were rushed and as such cannot be relied upon).

## Qualitative and Quantitative

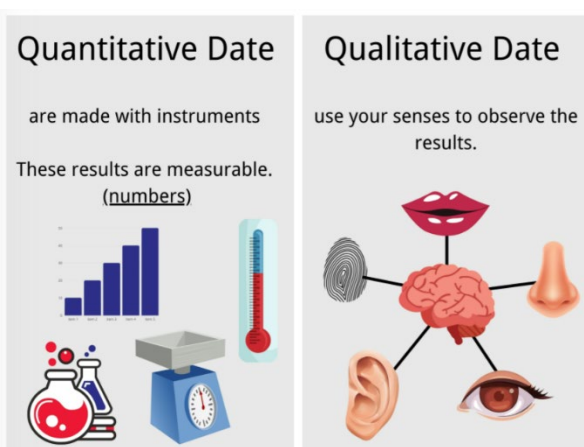
Qualitative measures:

- Can observe and describe data but cannot measure it numerically.
- Use subjective, opinion based, comparisons. For example, they can rate the performance in different areas as "high", "medium", or "low". Or as "good", "average", or "bad".
- Because the information is not quantified, the results become less precise.

Quantitative measures:

- Collect numerical and statistical data. For example, taking precise readings when sampling for dust in a work environment.

Use precise measurements and allocate specific values. This is a lot more helpful in determining whether a situation is acceptable or not. Using the above example, the measurement of dust in the atmosphere is either within the safe working levels or it is not. The data makes that judgement very easy to reach.



## Quantitative and Qualitative Data

## Health and safety monitoring and measurement techniques

### Collecting and Using Sickness Absence and Ill-Health Data

Sickness absence data is a valuable source of information. When workers are off sick, it allows organisations to use the data to look for patterns or trends. This may indicate deficiencies in parts of the health and safety management system (such as defective or outdated control measures, working practices, procedures, or behavioural issues) and may suggest that changes are needed (such as improved health surveillance, training, or an improved procedure).

Data can be collected from a variety of sources, including the organisations':

- Accident and ill-health reporting procedures
- Return to work interviews
- Compensation claims
- Discussions with workers or worker representatives

Significant trends may justify a change in strategy or policy. For example, a trend of call-centre agents taking one or two days off work may indicate a work-related ill-health problem. The return-to-work interviews could identify a common complaint of neck pains, or wrist discomfort. If the workers do not recognise these symptoms as work-related, they would not get reported through the usual reporting procedures. However, analysis of the absence data could reveal this trend, and this would be an opportunity for an investigation and early intervention to support the workers.

It is not good practice to rely on this data alone.

### The Role, Purpose and Key Elements of Common Monitoring Techniques

#### Health and Safety Audits (improvement opportunities)

The HSE define an audit as:

*"a structured process of collecting independent information on the efficiency, effectiveness and reliability of the health and safety management system. If deficiencies are found, then the audit will result in plans for corrective action".*

The principle of auditing has long been established in both financial management and quality assurance. It is essential that systems are devised so that the safety of the operation can be checked in the same way that organisations look at efficiency and economy. It monitors safety procedures and is integral in ensuring that safety is maintained at the right level.

Audits do not just focus on documentation. That is only part of the audit. The audit has three sources of information:

- Observations of the workplace, activities, and behaviours
- Interviews of managers and workers
- Documentation relating to the system e.g., policies, procedures, records, reports

The purpose of an audit is:

- To confirm the existence of a system, and to carry out a systematic critical examination of that system
- To collect objective evidence and information

- To check whether the system is effective at managing risk and whether it is reliable
- To compare the system against the requirements of a known standard (for example, an internal standard or procedure, or an external standard such as ISO 45001:2018)
- To draw up plans for corrective action if the audit identifies any deficiencies or the potential for improvement
- To identify the strengths and weaknesses of the health and safety management system

## Internal and External Audits

Audits can be both internal and external. An internal audit is carried out by employees of the organisation. Some organisations even have their own dedicated Audit Team. The benefit of this is that they have good knowledge of the organisation, and they are much cheaper than hiring external auditors. However, they may lack independence, can be influenced by internal politics, and may not have up to date knowledge of industry best practice. External auditors are more expensive, more difficult to arrange, have less familiarity with the organisation and people, but are much more independent, less likely to be influenced, and have knowledge of industry best practice.

The table that follows compares internal and external audits:

Internal Audit	External Audit
Easier to arrange	More time needed to organise
Auditors familiar with organisation	Less familiar with organisation
Informal, less threatening	More formal, more “threatening”
Cheaper	More expensive
May be influenced by internal relationships	No internal relationships
May be biased	Unbiased
Assumptions may influence conclusions	Independence requires auditors to ask obvious questions



## Key Elements of an Audit

There are three parts to the audit:

- Planning and preparation
- The audit itself
- The close out meeting, report, and corrective action plan

## Planning and Preparation

The objectives and scope of the audit need to be agreed with the audited organisation. For example, the audit could be a comprehensive audit covering the whole management system or workplace. Or it could focus on a selected topic, such as the Permit to Work procedure. The auditor and the organisation also need to agree if the audit has any specific objectives. For example, could this be an audit that identifies the improvements necessary to comply with an external standard? Is it an audit carried out to satisfy senior management that the law is complied with?

Once the scope has been agreed, the audit team can be selected. The size of the team will depend on the scope of the audit. If the audit is extensive, special expertise may be required. For example, fire expertise, occupational health, contractor management, etc. Consideration must be given to the level of competence of the auditors. They should be experienced at auditing and have knowledge and experience of the type of workplace and processes relevant to the audit.

The audit team should also be as independent as possible, so they can draw objective conclusions without being positively or negatively influenced.

Documents will be requested from the organisation for prior examination. This will include the policies, procedures, and records that are relevant to the scope and objectives.

If the audit aims to compare the system against a known standard (such as ISO 45001:2018, or an internal procedure), then this standard must be referred to, so the auditors are familiar with what it requires.

Questionnaires and checklists may then have to be developed, dependent on the standards to be applied. These checklists are essentially a series of yes and no questions. For example, one of the questions to check compliance with ISO 45001:2018 could be "*Are relevant outputs from management review made available for communication and consultation?*"

Interviews with a wide range of individuals need to be arranged. This will include:

- Workers
- Managers
- Professional experts, such as Process Engineers, Human Resources personnel, Health and Safety Team
- Directors
- Other stakeholders, such as Health and Safety Representatives, Contractors, Suppliers, Clients

The audit team will have some input on the categories of people to be audited. The organisation is then responsible for arranging the interviews.

The audit team will want to tour the workplace and observe the activities that take place. The necessary arrangements may include warning the relevant line-managers about the planned tour, providing any necessary induction and information to the audit team, providing them with any necessary PPE for their safety, and arranging a person to escort them.

The timings of the workplace tour and interviews should be agreed in advance, so there is a firm and clear timetable of audit activities. It is not acceptable to improvise. This makes good use of the audit team's time.

The audit team may require the use of facilities, such as an office for interviews and report preparation, and use of the telephones and internet. Basic welfare arrangements such as access to toilets, drinks, and food should also be provided.

The method of feedback for the audit findings should be agreed in advance. There are various methods of providing feedback. It could be one method or a combination of methods. These include:

- Daily reports on the activities and preliminary thoughts and findings.
- Verbal report and presentation at the end of the audit.
- Written report submitted in paper and/or electronically.

It will be necessary to agree the timescales for the submission of the report. Consideration should be given to when the results are needed. This could be immediately after the audit, or the audit team may have or require extra time to write the report.

Finally, access to the workplace and records may require authorisation and cooperation from management. For example, access to training or health records may require permission from the Human Resources department, since

some of this information may be confidential. Since the audit team will be interviewing workers, this requires the cooperation of line-managers who will need to release their workers for the duration of the interview.

## The Audit Process

The audit will generally start with an "opening" meeting between the audit team and the organisation management. This will confirm once again the scope of the audit, timings, and feedback mechanisms. The audit team will then start to collect evidence on which to base its findings. This is usually done by:

- Site familiarisation tour, and observation of the activities and workplace conditions.
- Interviewing personnel, as previously arranged.
- Examination of documents and records that were not previously available.

In order to be able to draw accurate conclusions, the audit should sample an important part of the main activities and interview a representative cross section of the relevant personnel. There should not be an excessive focus on documentation or records. The observation of activities and the interviews are also highly important in determining whether the systems are used and effective. Records may demonstrate that training is carried out, but observation of activities will show whether the training has been effective at influencing human behaviours.

INTERNAL AUDIT CHECKS		Doc: QF82-02-03	Revision: A	Pg. 4 of 5	
Refs	Requirements	What to look for and how	Completed	Auditor notes and evidence	
4.2.4 820.184	Are Device History Records (DHR) maintained for each manufactured batch, lot, or unit? (refer also to ISO 13485 Clause 7.5.1 and 820.184)	Are DHR records properly identified to specific batches, lots, or units; and are the records easily retrievable? (For other questions refer to 7.5.1)			
4.2.4 820.186	Are Quality System Records (QSR) maintained, including current and obsolete quality system manuals and procedures, and records of quality system activities such as management reviews, corrective and preventive actions, internal audits, etc?	How is it determined and documented what quality system records are maintained (in QMS Manual and lists of procedures and work instructions)? Are retention periods specified for obsolete quality system documentation and for quality system records?			
4.2.4	Are sufficient records maintained to provide evidence of conformity and effectiveness of the quality management system?	Is there a list (or other documented specification) of quality system records that are maintained by the company? Are the records sufficient to demonstrate product and process conformity, and the conformity and effectiveness of the quality management system and its implementation?			
<b>5 Management Responsibility</b>					
<b>5.1 Management commitment</b>					
5.1	Is the top management: <ul style="list-style-type: none"><li>• Communicating to the organisation the importance of meeting customer and other applicable requirements</li><li>• Establishing the quality policy</li><li>• Establishing quality objectives</li><li>• Conducting management reviews</li><li>• Ensuring availability of resources?</li></ul>	How is importance of meeting customer and other requirements communicated? Do employees understand the consequences of failing to meet requirements? Is there a quality policy? Are quality objectives defined? Are adequate resources necessary for the quality system provided?			
<b>5.2 Customer Focus</b>					
5.2	Is the top management ensuring that customer requirements are determined and are met?	What measures are implemented to ensure that customer requirements are determined and met (processes, procedures, training, monitoring, auditing, etc.)?			
<b>5.3 Quality Policy</b>					
5.3 820.20 (a)	Is there a documented quality policy; and <ul style="list-style-type: none"><li>• Is it appropriate to the purpose of the organisation?</li><li>• Does it include a commitment to comply with?</li></ul>	Is the quality policy appropriate (relevant to the types of products, type of market, customer expectations, etc.)?  Does it include explicit commitment to comply with requirements and maintain (or improve) the effectiveness?			

## Audit checklist

## Audit Close Out

In most audits, the audit team will deliver verbal feedback to the organisation's management at the end of the audit. This is commonly referred to as the "close out" meeting, or the "wash up" session. It is an opportunity for the management to find out if any major weaknesses were identified, and to hear the audit team's preliminary findings.

After the audit team has departed, they will draft an initial report. This will initially be sent to the Senior Manager responsible for health and safety. This is an opportunity to correct any factual mistakes, and for the organisation to provide any necessary clarification.

Once the draft of the report is approved, the findings of the audit will be then communicated back to the organisation's senior management in another close out meeting. This will contain information on:

- The scope and objectives of the audit
- The activities that took place during the audit (i.e., areas visited, people interviewed, documents checked)
- Findings of the audit, along with evidence
- Details of any non-conformances and areas of potential improvement
- Recommendations on corrective and improvement actions, with suggested priorities and timescales for completion

The senior management will consider the report's findings and agree on actions to be implemented. This will include specific people to implement the actions, timescales, and the provision of any necessary resources.

Audit findings should always be presented to senior management. This is because:

- The involvement of senior management demonstrates to the audit team that they are committed to health and safety. A senior management team who cannot make time to review audit findings shows a disregard for its importance.
- Corrective actions will need the authorisation of senior management.
- These actions may also require significant financial resources. Only senior management can authorise this.
- Senior managers have personal legal responsibilities relating to health and safety management. They will want personal assurances that they are not at risk of prosecution. Being involved in the audit is a way of carrying out "due diligence".
- In the cases of significant non-conformances being identified, senior management may need to discipline those responsible. Alternatively, senior management may choose to praise, recognise, or reward those responsible for positive findings.
- The findings will influence future safety targets, objectives, and plans, all of which need the authorisation and approval of senior management.



### **The Audit Process**

### **Workplace Inspections**

Inspections usually involve the physical examination of the workplace, equipment, and activities, with the purpose of identifying hazards or conditions, and deciding whether or not they are satisfactorily controlled. If not, remedial action will be suggested.

Inspections can be carried out at any time. However, it is preferable for an organisation to have a programme of scheduled inspections at planned intervals.

There are different types of inspection. These include:

- A general inspection of the workplace, often conducted by line supervisors, worker representatives or health and safety personnel. This involves a walk around the workplace, often using an appropriate check list, to identify poorly controlled hazards or to check compliance with standards. This can include hazards or standards associated with the workplace itself, equipment, or activities being undertaken e.g., examples of poor housekeeping, spillage equipment intact and ready to use, all necessary guards in place, use of PPE, fire exits are clear, etc.
- Pre-use inspection, where the user of equipment or line-manager checks it is safe to use before using for the first time on that particular day or shift. For example, a pre-use inspection of a forklift, or a pre-shift guarding check of a production line.
- Statutory inspection, where the inspection type and frequency are determined by law. For example, in the UK, lifting appliances, such as cranes, are required to be thoroughly examined every 12 months.
- Compliance inspection: involves checking on workers to see whether a specific safety procedure is being complied with. For example, permit to work compliance.



- Commissioning inspection: involves checking a new installation, such as a building or equipment, to check that all essential safety features are in place before commissioning or start up. For example, handrails fitted to stairways and platforms have edge protection.

### **Reasons for Carrying out Inspections**

There are several reasons why an organisation might carry out an inspection:

- Carrying out inspections may be a legal requirement. It may also be required by the organisation's health and safety management system.
- Inspections are visible events that help maintain the focus of line-managers and workers on ensuring good standards of health and safety. Ultimately, inspections aim to identify poor standards at an early stage before they result in an accident. Therefore, they help keep people safe.
- They can be carried out after an incident, or suspected non-compliance. For example, if the health and safety manager has a suspicion that a permit to work procedure is not being properly followed, they can carry out an inspection to check.
- Trade unions and workers may request that an inspection is carried out in the workplace or equipment. Often, this will be following complaints of poor standards.
- Third parties, such as insurers, may require the organisation to have a programme of regular inspections to demonstrate good standards of safety are being maintained.
- Inspections help identify non-compliance with standards and remedy these before they result in an accident.
- Inspections are useful after a change has been introduced in the workplace. Changes in standards are often difficult to maintain since it takes time for workers and managers to develop new habits. Therefore, regular inspections will help keep a focus on maintaining the change and forming new habits. For example, it can take time for workers to remember to always wear a new item of PPE. Regular inspections to check PPE is being worn can help reinforce the new behaviour.

### **Factors to Consider when Developing and Implementing an Inspection Programme**

It is part of the health and safety professional's role to develop and implement inspection programmes. It is, therefore, important to understand what factors should be considered when making these arrangements. These include:

- An inspection programme should only be developed if senior management are committed to providing the necessary time and resources.
- The type of work being carried out. It may be high risk, or low risk. The higher the risk, the more often the inspections should be carried out.
- The size and complexity of the operation. The larger the operation, the more areas and equipment there is to inspect, which will take longer and require more people. The higher the complexity, the greater the required knowledge and expertise of the inspector.
- The types of hazards. Some hazards can be identified visually with great ease. Others may need equipment to be disassembled, therefore this will require tools and engineering experience. Other hazards, like noise or gas, may not be visible and will require detection equipment to identify.
- The timing of the inspection. Certain activities may be regular or occasional. Consideration must be given to covering all known activities in the programme. All people should also be subjected to inspection. This can present some practical challenges when the organisation operates a shift system. All shifts should be inspected in the programme.

- The history of accidents and incidents will influence the regularity and frequency of the inspections.
- Legislation may require specific types of inspections at specific intervals.
- The organisation may choose to comply with industry best practice or codes of practice. These may identify intervals for inspections. For example, the construction industry may choose to visually inspect its extension cables every three months.
- The organisation's safety policy may specify a frequency of inspection.
- Some inspections may be notified in advance, but other inspections can be carried out without warning. A combination of both approaches is most effective.
- The necessary competency of the inspection should be considered. Some types of inspection will require different skills and competencies.
- Who will receive the findings of the inspection, and who is responsible for correcting any faults.
- There should be a clear protocol of what to do if the inspector identifies a serious and imminent threat to safety. They must be given the authority to stop the job if that is what is required.
- The inspections will require resources in time, and possibly equipment. Any faults will need correcting, and this also will require some time and financial resources. An inspection programme is worthless if the organisation is not committed to spending the time and money correcting the faults.
- Inspectors often find it useful to use a checklist. Consideration must be given to developing a checklist that is relevant to the area, activity, or equipment being inspected.
- Inspectors may need to comply with safety rules for their own safety. Therefore, they should be provided with all necessary instructions and PPE.

Inspection Items	Implemented?		N/A	Remarks (i.e.) specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)
	Yes	No		
1. Air pollution control				
1.1. Are the construction sites watered to minimize dust generated?	✓			
1.2. Are stockpiles of dusty materials (size with more than 20 bags cement) covered or watered?	✓			
1.3. Cement debagging process undertaken in sheltered areas	✓			
1.4. Are all vehicles carrying dusty loads covered/watered over prior to leaving the site?	✓			
1.5. Are demolition work areas watered? (e.g. trimming activities by using breaker)			✓	
1.6. Are dusty roads paved and/or sprayed with water?	✓			
1.7. Are dusty roads controlled during percussive drilling or rock breaking?			✓	
1.8. Are plant and equipment well maintained? (any black smoke observed, please indicate the plant/equipment and location)	✓			
1.9. Is dark smoke controlled from plant?	✓			
1.10. Are there enclosures around the main dust-generating activities? (e.g. grout mixing)	✓			

#### **Example of an inspection checklist**

## Skills and Knowledge of an Inspector

Inspections can be carried out by a variety of different people, such as workers, worker representatives, line-managers, and health and safety personnel. Some basic skills and knowledge are required. These include:

- Awareness of their own limitations. The inspector must know the limits of their knowledge and experience, so they can ask for advice and help if they are not sure.
- They must have ability to stand and watch, with good observational skills.
- They must be able to record what they find and write reports.
- They must know who to report their findings to.
- Inspections often require interaction with other employees. It helps if the inspector has good interpersonal and questioning skills.
- They should be able to identify hazards and risks in the workplace.
- They should have knowledge of the organisation's processes and procedures. For example, they should be familiar with housekeeping standards, PPE rules, and what safe systems of work should be in use.
- They should have good knowledge of the workplace and the activities that take place.
- They should be familiar with the control measures in place, so they can identify when these control measures are not being used.

It is also helpful if they have a working familiarity with the relevant health and safety legislation and guidance.

## Safety Tour

This is a brief (usually 15 to 20 minutes) walk around a work area, by the responsible manager (or sometimes management team), looking at one or more aspects of the work areas activities. They may be accompanied by the Health and Safety Committee or workers' representatives.

The safety tours are usually unscheduled in order to assess the reality of how people work. By doing this, the person observing can see whether risk assessments and controls are being understood and relevant procedures are being followed.

The people involved will check that workplace conditions and standards are good and in accordance with any written procedures and systems of work. Health and safety issues will be discussed with the workers giving the observer the opportunity to listen to any comments, suggestions, or complaints.

Safety tours can highlight any deficiencies in supervision. With workers being able to speak directly to a manager, concerns that have previously been raised to a supervisor and gone unheeded can be uncovered.

Another important purpose of a safety tour is to demonstrate management commitment to health and safety. Workers will see them visibly getting involved in safety in the workplace and feel that they are given the opportunity to discuss concerns or queries with them directly.

Overall, a safety tour can intercept bad practice or ineffective procedures before any accident, ill-health or injury occurs and, in this way, can be referred to as proactive. A reactive tour would be one that is done in order to see new procedures in practice after a previous incident to ensure any previous bad habits or techniques are corrected.

## Safety Sampling

The HSE define safety sampling as: *"the systematic sampling of particularly dangerous activities, processes or areas."*

A small sample of a particular topic is taken. Some examples are:

- A small number of lifts are observed
- A small number of forklifts are checked
- A small number of people are checked for PPE compliance

The results of this small sample are assumed to represent the performance of the whole (all of the lifts, all of the forklifts, all of the PPE compliance, etc.).

It is a technique that is used to estimate the potential for accidents. It can be performed by supervisors, workforce representatives or health and safety personnel.

The defects that are spotted are noted. The total number of defects is added up to give an index of accident potential.

To ensure consistency, it is usually a timed activity over a nominated walking route. The same route is followed every time the sample is taken, and the sampling should take the same length of time. It is repeated periodically in order to determine improvement or deterioration.

## Safety Surveys

These involve a detailed investigation of a specific aspect of the workplace when, for example, a health and safety inspection has shown a possible hazard that needs further analysis. For example, an inspector might perceive high levels of noise in an area, and this will need detailed measurement and analysis.

The purpose of the survey is to determine whether there is a hazardous situation, or not. Surveys can look at hazards such as:

- Lighting levels
- Noise
- Vibration levels and duration
- Hazardous substances such as dust, fumes, vapours, etc
- Temperature
- PPE compliance
- Behavioural attitudes such as worker attitude to safety

## Safety Conversations

Safety conversations are informal conversations that take place in the workplace. They are usually carried out by visiting managers, worker representatives, or health and safety personnel. On a scheduled basis, they will tour the workplace and speak to several workers to have a casual and informal discussion about the work being done and the safety implications. These tours and conversations will normally happen several times a month.

These conversations will include the following elements:

- Introductions. Who you are? Ask the other person who they are, what they do, and what job they are carrying out at that moment.
- Possible questions are:
  - How can you get injured? What are the risks?
  - What have you done to protect yourself?
  - What else could you do?
  - Where do you think the next injury will occur?
  - How will you contribute to the prevention of this injury?

These are "open" questions that require more than a "yes" or "no" answer and will encourage the worker to respond with a longer answer and engage in the conversation.

The person doing the job should then be encouraged to put in place any safety improvements they identify as quick fixes. Those that are not quick fixes (i.e., those which require significant costs or change) should be recorded and raised with management.

Safety conversations are a useful tool to ensure safety is being considered and discussed in the workplace at worker level. They are especially useful when the organisation is trying to encourage worker ownership and involvement in health and safety. Recording the number and results of safety conversations also help demonstrate legal compliance. They increase the awareness of risks and create an opportunity for safety improvements.

## **Behavioural Observations**

There are a variety of different methods of behavioural observation. But they all have one thing in common: behavioural observations are essentially the observation of workers in the workplace. What they are doing, how they do it, what tools and equipment they are using, the general area around them. Risky behaviours are challenged. Safe behaviours are praised. The results are reported to management, who then takes action to improve behaviours further.

The purpose of this activity is to reduce the incidence of risky behaviours, resulting in fewer accidents and ill-health.

The organisation must first identify the risky behaviours it seeks to eliminate, and what safe behaviours it wishes to encourage. Official observers must be nominated (preferably volunteers, who are trusted by the workers and respected for their fairness). All employees and workers can potentially be an observer if they are given suitable training. Checklists of undesirable and desirable behaviours will be created.

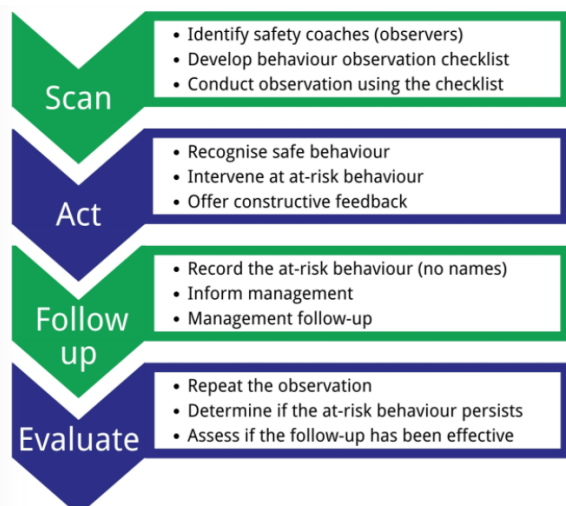
Using these checklists, the observers will carry out observations of behaviour. Safe behaviour is recognised, praised, and recorded. If poor behaviour is observed, then the observer will intervene and offer constructive feedback. Both safe and poor behaviours are recorded. But the names of those behaving unsafely is NOT recorded. If it were, then the observers would not be trusted or respected.

The findings are reported back to management. They review the levels of safe and unsafe behaviour, and act to improve behaviour further. This could mean further training, toolbox talks, safety conversations, supervision.

The observation is then repeated periodically, to identify whether behaviour improves or deteriorates.

Remember: SAFE

1. **S** - Scan
2. **A** - Act
3. **F** - Follow up
4. **E** - Evaluate



#### ***Steps for behavioural observation***

#### **The in-house health and safety professional's role in audits carried out by external/third parties (for example, during a certification audit)**

External audits can be very stressful, but the key to decreasing the stress and increasing the benefits is preparation. It is here that the organisations' safety professional has a big role to play. The more organised the safety professionals during the audit, the more organised the organisation will appear to the auditor. In the auditing world, initial impressions of the premises, the safety professional's preparation, and the availability of documentation are often difficult to overlook.

The OHS professional has a key role in ensuring:

- The audit is booked well in advance of any due date.
- Realistic time is allocated (base it on the duration of the previous audit) and flexibility is in the timetable.
- The business and processes will be working and producing normally at the time of the audit. No audits when the business is closed, and work is not taking place.
- Key staff (management and interviewees) know the audit date, are available, and attend their appointment.
- The findings of the previous audit are reviewed, and all corrective actions have been completed.
- Any documentation required by the auditor is readily available. If it isn't and it can't be readily found, the auditor is hardly likely to have confidence in the system.
- Relevant senior management are available for the opening and close out meeting.
- Staff have been briefed about the audit. Some staff members can become very stressed during an audit, especially if it's their first time. Let them know what to expect, what questions they may be asked and what to do if they are unsure of how to reply.
- Facilities must be made available for the auditor. For example, a quiet office, access to drinks and other welfare facilities, and a guide for the duration of the audit. Usually this will be the safety professional.

Internal audits often require similar arrangements. The difference being that in some cases the safety professional may also be the auditor.

### **Benchmarking - comparison of previous performance data with that of similar organisations/industry sectors and with national performance data**

*"Benchmarking - A measurement of the quality of an organization's policies, products, programs, strategies, etc. and their comparison with standard measurements, or similar measurements of its peers."*

*The objectives of benchmarking are:*

- to determine what and where improvements are called for
- to analyse how other organizations achieve their high-performance levels
- to use this information to improve performance".

Benchmarking can be carried out within an organisation internally between departments, sites, or divisions. It can be carried out externally across industry and can provide a good measurement of how an organisation, or department is performing when it comes to managing health and safety. As soon as one organisation is seen as best in class, then others will seek to at least match, but preferably exceed, their performance. Senior managers and leaders can be very competitive in their attitude. If they realise that another organisation performs better than them in a certain area, they are often motivated to improve. As a result, benchmarking can have a significant influence on Corporate Governance and thus act as a catalyst for change.

Two things can be benchmarked:

1. Systems, processes, and standards. An organisation will compare its systems, processes, and standards with the industry best practice, with the intention of learning how to improve how it manages health and safety.
2. Performance. This is the comparison of key indicators of performance, with the similar performance indicators of others. If the organisation's performance falls below the others, then this would result in the organisation attempting to learn why.

Internal benchmarking is the comparison of processes and performance within the same organisation. For example, one department may have an accident rate of 1.17, but another similar department has an accident rate of 3. There is clearly a visible difference in performance, and the organisation would seek to learn what is causing this difference so it can be corrected. Similarly, one factory may introduce a new system for tracking actions through to completion, which is much more effective than the old way. This could be considered the organisation's best practice, and the new system could then be introduced throughout all of the organisation's sites.

External benchmarking is the comparison of processes and performance with other similar organisations, or national or industry averages. Essentially, it means asking the question: how do we compare with our competitors?

Benchmarking gives practical information by encouraging analysis of our own organisation and by close examination of other organisations, looking at their methods, processes, procedures, and performance. Benchmarking is a process, not an outcome. It should be used to examine particular issues and can be used to promote continuous improvement within our own organisations.

Organisations can partner together to benchmark against each other. Finding another suitable organisation to partner can be challenging if benchmarking is a new process. Organisations of similar size and using similar processes



should be considered. Finding a competitor to benchmark against is both challenging and beneficial to both parties. However, companies are often willing to share health and safety information, where they would not consider sharing information on other business activities. This is because improvements in safety protection are seen as a benefit to the community at large and not a threat to shareholder value.

**Potential benefits of benchmarking include:**

- Improved OHS performance
- Reduced injury and ill-health costs
- Reduced incident response costs
- Improved reputation (held in high regard by public and industry)
- Striving to be "best in class"
- Lower insurance costs
- Learning from others and adopting "best practices" instead of inventing new systems
- Motivated workforce, increased productivity, and less turnover of staff

**The Need for Formal and Informal Performance Reviews**

It is important that organisations review their health and safety performance. Reviewing performance tells the organisation whether the health and safety systems are effective in managing risks and protecting people. It informs management whether the basic health and safety principles, such as effective leadership and management, competence, worker consultation and involvement, have been embedded in the organisation. If any deficiencies are identified, the review process then needs to determine what actions are necessary to remedy these. This will include allocating the appropriate management focus, resources, priorities and delegating responsibility to specific "action owners" with deadlines.

The objectives of a review are:

- To make judgements about the adequacy of health and safety performance
- To obtain assurances that the system for managing health and safety is working
- To ensure the law is complied with
- To set standards of performance
- To improve performance
- To respond to change
- To learn from experience

**Formal Performance Reviews**

The formal management review is a requirement of most health and safety management system standards, such as ISO 45001:2018 and ILO OSH 2001. A formal review is also one of the ways senior managers demonstrate they have carried out all "due diligence", thereby showing that they have complied with any personal legal requirements as senior managers.

This is a formal scheduled review involving senior management, in collaboration with the relevant people involved in the day-to-day management of the health and safety systems. They take place at pre-determined intervals. Usually at least annually but can also be quarterly. The frequency depends on the level of risk and change.

Formal performance reviews can also take place at a Departmental level, involving the management of that department.

### **Informal Performance Reviews**

The informal review usually occurs at a Departmental level when circumstances require one. A recent change in performance, especially a degradation in performance, will be noted by the Departmental management who will want to identify the reasons for this. They will then collect all the safety performance information, review this, and identify the necessary actions to carry out internally within their Department. This allows them to correct deficiencies before they are noted at the more senior, more formal, management review.

### **The Review Process**

Management reviews of health and safety performance will be scheduled at regular intervals. There will be a certain amount of preparation for each review.

The manager or director responsible for health and safety performance will collect all the necessary information (in other words, the "inputs") that is required for the review. This will be presented in a format that is useful for the senior managers to understand.

Firstly, there will be a management review "pack". This is a pre-meeting pack of information which can be studied by senior managers prior to the meeting. This gives them the opportunity to learn what the main problems are and what decisions will be expected of them in the meeting.

Secondly, there will usually be a presentation given to senior management, by the manager or director responsible for health and safety. Since senior managers will have limited time, the presentation on performance will need to follow a strict agenda, and only bring important or significant matters to senior management's attention. The information must be precise, clearly communicating what the problems are, what the potential risks are, and what the possible actions are, along with the advantages and disadvantages of each course of action. The senior managers can then discuss the various options and agree which is best.

These decisions and actions are then documented. They will include:

- The names of the people responsible for implementing the actions
- The deadline by which the action should be completed. The speed of action should be influenced by the level of risk
- The resources that are necessary and who will provide these
- Any new targets or objectives
- The introduction of new policies, and how these should be communicated and implemented

At the subsequent performance reviews, one of the first items on the agenda is the progress against these actions.

Senior management will want assurances that all agreed actions have been completed and are proving effective.

Reviewing should be a continuous process that is completed at all levels in the organisation from Executive management to apprentices. It includes:

- Remedying failures to implement workplace precautions during routine activities (first line supervisors or other managers)
- Correcting substandard performance identified by active and reactive monitoring

- Assessing plans at individual, departmental, site, group, or organisational level
- Assessing the effectiveness of the safety and health management system
- Responding to the results of audits

Key performance indicators that are used for reviewing performance should include:

- Assessment of safety and health system against legal requirements
- Identification of areas where the safety and health system has not been applied or requires improvement identifying what action is required (a "Gap Analysis")
- Assessment of how specific objectives and plans have been achieved
- Accident, ill-health, and incident data with a breakdown of the immediate and underlying causes, trends, and any common features

The review process should note successes and achievements as well as areas that have not performed. Positive information given to workers and management alike is an essential element in motivating employees to maintain and improve performance. Successful organisations promote positive reinforcement and concentrate on encouraging progress, rather than focusing on lack of achievement.

### **The Inputs to a Review Process**

The information driving and used in a review come from various sources:

- Internal performance data
- Health and safety objectives
- Organisational arrangements and change
- External standards and expectations

#### **Internal performance data**

The main sources of information for review come from measuring activities and from audits. We have previously discussed both active and reactive monitoring and measurement of performance.

- Results of internal and external audits, main findings, areas of non-conformance, and possible best practices that could be introduced.
- Evaluations of compliance with legal requirements.
- Evaluation of compliance with any applicable external standards or codes of practice.
- Results of participation and consultation, including employee thoughts about health and safety performance, their main concerns, their suggestions for improvement.
- Health and safety performance. This will include:
  - Results of active measurements, such as inspections, surveys, and sampling.
  - Results of reactive measurements, such as numbers of accidents, near misses, cases of ill-health, civil claims, enforcement action, etc.
  - Other data from the management system, such as the percentage of actions completed on time, amount of training delivered or yet to be completed, numbers of risk assessments reviewed, etc.
  - Details of incident investigations, corrective actions, and preventive actions. If corrective or preventive action has been implemented, or whether investigations into incidents are still in progress.

## **Health and safety objectives**

- Other sources include new legislation or changes in current good practice. Any of these can require changes to be made to the aims and objectives or specific areas of the safety and health management system.
- Extent of meeting objectives i.e., whether the objectives agreed at the last review or in the policy been achieved and if not, the extent of any progress made.
- Follow-up on previous management review actions. Have they been completed? Are they effective? If they have not been completed, why not?

## **Organisational arrangements and change**

- Knowing any developments in legal requirements for the organisation.
- New technologies which could allow better control of risks.
- New processes being introduced in the organisation.
- Changes in the organisation and the potential health and safety impact, such as restructuring, new products, large projects, etc.
- New external standards that must be adhered to.
- Changes in expectations from clients, shareholders, regulatory agencies, insurers, workers, and society in general.

## **External standards and expectations**

### **Legislation and ACOPs**

- Requirements for reviews on policy
- Risk assessments especially for specified risks that may be covered in specific legislation
- Changes in legislation
- Treaties shaping national ratification or standards

### **Insurance**

- Increased claims
- Additional requirements requested following incidents or national policy changes
- Changes in standards required to obtain insurance

### **Shareholders**

- Requirements for review following decline in profits or increase in reported incidents

### **Stakeholders**

- Feedback from customers
- Changing requirements from the neighbourhood such as new developments
- More stringent controls being requested following incidents and accidents

### **Manufacturers**

- Change in instructions for use of equipment
- New data and safe use requirements for chemicals and materials

## Unions

- Changes in policy for acceptable working conditions
- Following strike action or opinion polls for change

## The Outputs of a Review Process

From the above inputs, there are a few "outputs", including decisions and actions from the review that need to be made. They can result in:

- Actions and improvement plans
- Stakeholder reports
- Performance targets

### Actions and improvement plans

As previously discussed, the performance review will result in action and improvement plans. These should identify:

- What needs to be done
- Who will be responsible for implementation
- A specified date for implementation (when it needs to be done by)
- Resource implications covering impact on time, staff, capital, ongoing costs
- Additional risks that may require assessment
- Date for review

### Stakeholder reports

The output of the review will be communicated to a variety of stakeholders. For this reason, it is necessary to keep a record of:

- What was reviewed
- Conclusions drawn
- Decisions made
- Actions agreed

This information can be communicated to a wide number of stakeholders:

- Internally, within the organisation, to all employees. Seeing that health and safety management is being addressed at a senior level can be motivating and can boost morale.
- Externally:
  - In the annual shareholder report if the organisation is publicly owned.
  - With insurers if they require to see evidence of reviews being carried out.
  - With regulators, possibly during a prosecution or other enforcement action.

### Performance targets

The final output of a review is the amendment or creation of performance targets. Since the organisation is attempting to continually improve, new performance targets will need to be created. Targets can also create a focus on specific areas where senior management wishes to improve performance. For example, if the management review determines that too many workers are suffering from cuts from knives, they may introduce a new target for

the reduction of hand injuries, or a target to get all workers trained in the safe use of knives and the supply of specific PPE.

## Learning outcome

- 6.1: You will be able to continually develop your own professional skills and ethics to actively influence improvements in health and safety by providing persuasive arguments to workers at all levels.

### 6.1: The role of the health and safety professional

#### **Why a health and safety professional must understand what can affect their organisation's ability to manage its health and safety responsibilities (the context of the organisation)**

A Health and Safety professional must understand that there are certain things that affect the ability of an organisation to manage their health and safety responsibilities and therefore can hinder their role in being a resource to the organisation.

Some of these include the following:

The Health and Safety professional may feel that there is a lack of control within the organisation for the way work is being done. It may be being done in a manner which is not conducive to safe working but at the same time may benefit the organisation in terms of time and productivity.

Managers and workers within an organisation may be overloaded with work and therefore tasks that may be delegated to them by the Health and Safety professional such as the completion of audits or the first line investigation of accidents may not be seen as high priority. At the same time managers and workers may feel that it is not their responsibility to manage Health and Safety within the organisation and that it is the role of the Health and Safety professional to undertake this area of work. These can all hinder the organisation's ability to manage Health and Safety.

In turn this may have an impact on their relationship with colleagues who feel that the Health and Safety professional is not fulfilling their role within an organisation and creating conflict. They may see the Health and Safety professional as someone who may be causing difficulties in terms of their work output.

Finally, most organisations are at some point going through some form of organisational change and this can cause uncertainty amongst the workforce. If organisational change is poorly managed, it can have an impact on the wider workforce and in turn affects the ability of the organisation to manage Health and Safety due to the time and effort required.

#### **The role of the health and safety professional in protecting workers, employers, and third parties and the potential conflicts that this role brings**

The role of the health and safety professional can vary between different organisations, the size of the organisation and the level at which they are appointed. Organisations can range from corporate with a department dedicated to health and safety or small businesses or charities that only have a standalone HSE officer/adviser.

In some cases, a dedicated health and safety is not employed by the organisation and instead, consultants are engaged. However, recent research by Cardiff University on behalf of the UK Institution of Occupational Safety and Health (IOSH) has concluded that for best practice and more positive results, a consultant should be engaged in addition to an organisational health and safety professional in order to supplement the skills required for this area of expertise.



Health and safety professionals can be engaged in various capacities and this will dictate the role that they are expected to fulfil. They could be engaged full-time or part-time and their role could be dedicated to health and safety or they may have this responsibility in addition to a more regular role within an organisation. Examples of roles are consultant, self-employed or partner consultant, regulator, audit/inspection/enforcement officer and the requirements of the role is dependent on the sector (for example construction, insurance, training).

The OHS professional will need to communicate and work with people from a wide variety of roles and these include but are not limited to:

- Workers
- Senior management
- Human resources
- Insurance companies
- Enforcement authority
- Local authority
- Engineers
- The police
- Occupational hygienists and other health and safety professionals
- Ergonomists and other specialist roles
- Sector specific roles and workers (e.g., construction, processing, administration, manufacturing)

If working at board level, the responsibility of a safety professional, in addition to give advice on measures to reduce risk from hazards, is required to have the competency and responsibility to:

- Formulate and implement policy
- Advise on strategic organisational developments
- Set budgets and accounting for expenditure
- Oversee managers and supervisors in relation to HSE requirements
- Promote good leadership and enhance HSE culture among workers

The practical tasks that might be expected of a “field” based health and safety professional include:

- Maintain adequate information systems on topics including civil and criminal law, health and safety management, and technical advances
- Developing and assisting in implementation of safe systems of work
- Carrying out or assisting with, risk assessments
- Supervising occupational health surveillance
- Organising any biological health surveillance
- Delivering training
- Administration
- Producing reports for senior management
- Budgeting
- Investigating, or assisting with investigation of, any accidents or incidents
- Conducting inspections and audits
- Arranging and monitoring accreditation levels

## Skills and Competence

In order to perform well, the health and safety professional must possess:

- Relevant qualifications suitable to the level of responsibility
- Interpret the law in the context of their own organisation
- Present their advice independently and effectively
- Ability to communicate with people from Director level to apprentice
- Scientific and relevant technical expertise in relation to the organisational activities
- Ability to think quickly and solve problems in time-sensitive and sometimes difficult situations
- Good understanding of professional boundaries coupled with proven management skills
- Understanding of legal requirements within the organisation
- Skills required to monitor and sample hazardous environments

The UK HSE define competence as *"...the ability to undertake responsibilities and perform activities to a recognised standard on a regular basis. It combines practical and thinking skills, knowledge and experience."*

Health and safety professionals gain their practical thinking, skills, knowledge, and experience from a wide variety of sources. The sources are different for everyone and people process these areas differently depending on their personality, ability and understanding of situations. Therefore, competence will vary from person to person.

People engaged to perform a specific position or job like to demonstrate their competence for the requirements of the role and where this is a defined position that requires a specific skill set, this is understandable. However, the role of a health and safety professional is so wide ranging it is very unlikely that the professional will have full competence to deal with every area. In order to safeguard their own health and safety and that of others, it is essential to realise where the boundaries of competence lie. This again will be different for everyone.

If a health and safety professional does not understand the limits of competence, they risk taking on a task or assessing a situation that could have dire consequences for workers, the public or themselves if an important area is missed or underestimated in any way.

Health and safety professional must therefore have the integrity and honesty to admit when they do not feel they have the competence to deal with a given situation. They should know when someone with the correct skills, knowledge and experience of the specific area should be consulted. Ideally the professional should be able to source a person that does have the competence in question, and this is often accomplished through networking with other health and safety professionals. The competence of workers within the organisation should never be dismissed out of hand and this should be where the professional looks first, ensuring that suitable recognition is given to those who can offer specialist advice.

Being able to admit the limits of competency this is an admirable quality and being able to pinpoint which tasks require additional skills should not be seen as a failing.

### **The need for health and safety professionals to evaluate and develop their own practice so as to maintain competence**

Like many other professions, health and safety professionals need to evaluate and develop their competence. This can be achieved through continuing professional development (CPD). Many professional bodies, such as IOSH, require CPD for members to retain registered status. This can be done by keeping up to date with new developments (particularly within their own field/industry), keep up with legal changes, and changes in technology. CPD logs and portfolios are usually kept to demonstrate that a professional is "up to date."

Before a health and safety professional can develop their competence, first they must evaluate it. The evaluation will identify areas of weakness or potential improvement.

This can be done by:

- Reviewing the organisation's health and safety performance and trends. If there is a particular negative trend, this may highlight a lack of competence in managing that type of risk.
- Measuring changes and developments they have implemented in their organisation and evaluating how effective these have been.
- Setting personal objectives and targets and assessing their performance against these.
- Reviewing failures or unsuccessful attempts to produce change. The health and safety professional should seek the root causes. Sometimes one of the root causes is the competence of the professional. For example, the change was poorly communicated, or they did not arrange the necessary resources, or failed to follow-up and monitor the change.
- Benchmarking their practice against that of other health and safety professionals, or even non-health and safety professionals, such as HR professionals.
- Benchmarking their practice against published good-practice case studies or information.
- Seeking advice from other competent professionals.
- Seeking honest feedback in their individual performance reviews or annual appraisals from superiors.
- Seeking feedback from peers and subordinates in the organisation.

The health and safety professional can develop their competence by:

- Developing their core knowledge through study, and gaining recognised professional qualifications (for example, in health and safety, engineering, etc.).
- Taking part in ongoing training in relevant subject areas, such as specific health and safety areas, auditing skills, leadership skills.
- Taking part in a continuing professional development (CPD) scheme, which requires the health and safety professional to consider how their activities might be contributing to their development of competence.
- Ensuring they remain up to date through the consultation of various information sources, such as legal updates, webinars, magazine subscriptions, etc.
- Networking with peers at safety groups and conferences, sharing stories, experiences, tips, and advice.
- Actively seeking advice from fellow competent health and safety professionals or consultants.
- Establishing a formal personal development plan for the year, with a clear developmental goal, and several formal activities to achieve that goal. For example, a professional may wish to develop their training skills. They could take part in a training qualification, and then proceed to practice their new training skills in delivering one or more training sessions to workers.
- Taking part in practical activities, such as delivering training, carrying out risk assessments, auditing, incidents investigations.

### **The role of the health and safety professional in mentoring and supporting the development of health and safety competency in other relevant employees**

Mentoring is not the same as directly training. A mentor will act as a guide and source of advice for those who are undertaking training. The health and safety professional may play a part in developing competence in other workers and managers. As such they must understand how to mentor effectively and what advice is suitable and appropriate.

The health and safety professional is often responsible for arranging or delivering health and safety training programmes. They must assess the training needs of various employees within the organisation. They normally do this through a skills analysis. They look at each job role and identify the key health and safety skills required. They then look at the actual skills people have. There may be some gaps, and the health and safety professional must arrange training to fill those gaps.

A health and safety professional often introduces a safety-related change and plays a significant role in direct training and with mentoring individuals in developing their skills, particularly whilst going through a period of change.

After the training has been completed, the health and safety professional must not assume that the managers and workers are fully competent. They may have the knowledge but could lack the experience to fulfil their roles. The health and safety professional would need to spend time with each manager, and mentor them whilst they gain the relevant experience. As the manager gains experience, the health and safety professional could let the manager take the lead with the new systems. Finally, when managers feel confident perform the new tasks by themselves, the health and safety professional would monitor by checking various areas of the system over a period of time as with other systems. A good way to do this would be to encompass the new system checks in with existing safety tours, inspections, and audits.

The health and safety professional should always encourage worker development and where possible, help to provide opportunities for this within the scope of the organisation. This helps workers build up their competence and confidence. In return, workers will feel more loyalty towards the organisation and contribute positively into the overall culture.

### **The distinction between leadership and management and how this can apply to a health and safety professional**

A leader is someone who influences others to achieve goals. Leaders can make a positive impact on attitudes, behaviours, and organisational performance. They transform, energise, and motivate their workers to view work from different perspectives, to be aware of the organisations vision, to reach their full potential by challenging themselves, and work to benefit the team and not just themselves. Differences between managers and leaders include:

- Leaders create and communicate visions for the future. Managers develop a plan and allocate resources.
- Leaders encourage others to commit to a vision. Managers set objectives and organise a schedule.
- Leaders motivate and inspire workers to overcome barriers. Managers monitor situations and find solutions to problems.

A healthy and safe organisation requires both managers and leaders. The health and safety professional must have a combination of both leadership and management skills in order to communicate with all levels of the organisational hierarchy from senior management to new workers.

To speak to the leadership or senior management team, the professional should have an understanding of what vision the leaders lean towards and be able to encourage them to incorporate health and safety into this vision. In absence of a compelling health and safety vision, health and safety professional will often have to introduce this to the leadership team in a persuasive manner so that the vision and goals can be adopted. Senior Managers often have multiple priorities, and health and safety is only one of many. The health and safety professional will need to be persistent and patient until senior management "buy in" to the vision of health and safety and will commit their attention and resources to achieving set aims and objectives.

Once the leadership team agree these aims and objectives, the health and safety professional will have the responsibility to ensure that policy and procedures are introduced throughout the organisation which is where the understanding of management styles is required.

Managers need to turn the vision into a tangible system that can be monitored and measured. The professional will need to make all the necessary arrangements, delegate various tasks to others, monitor progress, find solutions when problems are identified, and continue to push for the vision to be implemented.

### **The need to adopt different management styles (which may include problem solving) dependent on any given situation**

We have previously looked at different management styles. A health and safety professional needs to understand when to use each method of management style. There is not one style that will suit all people. The professional will be dealing with people in all levels of the hierarchy and so they will need to determine which style is most suited to each individual that they interact with.

This is a skill that is developed with experience and training. In a smaller organisation, it is often easier to work out the correct method as people will generally work more closely with fewer tiers in the management structure and often less formality when people speak to each other.

Larger organisations will have more workers, less familiarity between workers and often more formality when different levels of the hierarchy speak or interact.

Therefore, it is good practice to ensure that the management style chosen not only reflects the person you are speaking to but that it is in context with the type of organisation and within the accepted structure in place.

Choosing the wrong style could alienate people if too autocratic. People may just feel that the professional is too vague if a more permissive style is chosen in the wrong context. In both cases there is a danger that workers may pay less attention to instructions from the health and safety professional. When dealing with matters that could affect the health, safety, and welfare of workers it only increases the risks of existing hazards.

Therefore, the health and safety professional needs to ensure that their competence encompasses effective communication to determine when they need to amend their style of management when required.

### **Role of health and safety professionals in Developing, Implementing, Maintaining, and Evaluating health and safety Management Systems**

One of the key roles of the health and safety professional is to manage the Health and Safety Management System.

They will need to develop it for improvement to ensure it remains relevant to the organisational activities. In practice, developing a management system means writing policies and procedures. This requires significant consultation with the various internal and external stakeholders regarding the policy and procedures. Once agreed the health and safety professional needs to ensure that the procedures are implemented to support the policy.

Implementation of a management system requires a degree of project management as various tasks to implement the policy and procedures will be delegated to different managers and workers across the hierarchy. The health and safety professional should control all aspects of implementation from one central point to ensure that all people involved know their own responsibilities and deadlines.

Once it is implemented, a new procedure can quickly fall out of use if it is not monitored. Therefore, there must be suitable monitoring of the procedure with regular updates and reminders, until it becomes a habit. Part of this

process may identify some initial problems when a new procedure does not quite work as planned. This may require some changes to be made. To ensure that problems are addressed correctly, good channels of communication should be maintained to give everyone involved the opportunity to discuss the reasons why certain procedures are not working or inappropriate. The health and safety professional needs to take responsibility for maintaining the communication and ensuring that problems are rectified by altering procedures where necessary.

There must be ongoing evaluation of the management system which means assessing whether it is working, suitable and sufficient. There are various methods to evaluate a system which have been discussed in other elements in this unit. The role of the health and safety professional is to ensure that evaluation is done in a timely manner and that feedback from monitoring and measuring is reported back to the leadership team in a format that will enable them to make decisions on any changes that may be required.

### **Why workers' information needs to be handled confidentially**

All workers deserve to have personal details kept private and respected. Indeed, it is a legal requirement in many countries (for example, the Data Protection Act in the UK, the US has federal (Data Protection Regulations) and State laws, New Zealand has the Privacy Act).

Workplace health and safety information that is likely to be considered "personal data" is likely to include:

- Driving licences
- Induction and other training records
- PPE records
- Medical and health surveillance records

Health and safety, and other, professionals should be clear as to what information they are collecting and the reasons why such information is required (for example, health surveillance records may be a legal requirement).

Failure to properly manage personal data (particularly sensitive data such as health records) may result in legal action taken against offending parties.

### **The health and safety professional's role in enabling work activities as part of proportionate and sensible risk management**

The health and safety professional should be able to advise the most appropriate technique(s) to be used in an organisation. Grossly over-estimating the levels of risk, implementing excessive levels of controls can lead to a loss of credibility. The health and safety professional must always remain proportionate when assessing and controlling risk.

This is also a requirement of the UK IOSH (Institution of Occupational Safety and Health) health and safety Code of Conduct:

*"Ensure that professional advice is accurate, proportionate, and communicated in an appropriate format... A proportionate approach to professional advice is required. For example, over-stating the risk may lead to excessive expenditure or further consultancy not necessarily needed."*

### **The contribution of the health and safety professional in achieving the objectives of an organisation**

The contribution of the health and safety professional in achieving the objectives of an organisation cannot be overlooked.

The main role of the health and safety professional in any organisation is not just to prevent accidents, incidents, and work-related illnesses but to create and implement a Health and Safety culture that is imbedded within an organisation. As well as creating and implementing Health and Safety policies, they will also undertake regular inspections in conjunction with management and employee representatives.

Some of their objectives will include raising awareness of Health and Safety issues and ensuring money is made available for improvements which have an impact on Health and Safety. They will also ensure that Health and Safety Training is made available and tailored to the needs of the workforce.

At board level this may include contributing to an organisation's risk register and ensuring that key Health and Safety risks are included and regularly discussed and reviewed. They may also work with organisations in terms of adopting international H&S standards such as ISO 45001.

### **Health and safety professional's role in change management**

The business environment that safety professionals work in today demands a great deal of agility.

Historically the role of the Health and Safety professional was to 'police' the workplace and lead Health and Safety compliance within an organisation and alongside that support and implement the Health and Safety policy.

However, in the modern workplace, this role is seen to be out of date and often Health and Safety professionals will find themselves adrift by the Health and Safety system they are supposed to be implementing. Therefore, the role of the Health and Safety professional must go beyond just simply compliance and have a more significant role in an organisation's change process.

Often a Health and Safety professional will be expected to broaden beyond their technical knowledge and have a role in an organisation in terms of building consensus between management and workers and acting as a coach and mentor to allow managers and organisations to take ownership for Health and Safety within an organisation and it not just be the responsibility of the Health and Safety professional.

The Health and Safety professional will require several competencies and skills. They can often fall into two categories. Hard and Soft skills. Some of the hard skills may be having additional knowledge in certain areas such as engineering or understanding the workings of a business and tailoring the Health and Safety advice accordingly. Soft skills are becoming more apparent within a business and this can include such skills as communication and leadership and behaviours such as customer service, problem solving, the needs of the business and the ongoing analysis of risk.

### **The meaning of the term 'ethics'**

The dictionary definition of "ethics" is:

*"moral principles that govern a person's behaviour or the conducting of an activity."*

A business-related definition is:

*"The basic concepts and fundamental principles of decent human conduct. It includes study of universal values such as the essential equality of all men and women, human or natural rights, obedience to the law of land, concern for health and safety and, increasingly, also for the natural environment."*

Professional ethics may be defined as:

*"the personal and corporate rules that govern behaviour within the context of a particular profession"*.



An example of professional ethics is the UK IOSH "Code of conduct" guidance for its members, which we have already mentioned.

The current climate means that stakeholders such as environmentalists, consumers, the media, and other pressure groups are expecting and demanding more socially responsible and ethical approaches to the way in which business is conducted by organisations. With the speed of social media, one bad decision can escalate and destroy businesses within 24 hours.

Firms therefore recognise that good ethical behaviour requires more than a corporate social responsibility policy. The public wants to see practical demonstration of good intentions. With globalisation, it is also important to realise that what is acceptable in one country is not in another. For example, in Europe, it is expected that in times of economic downturn, employees will be laid off. In China this would not be acceptable and would reflect poorly on the organisation.

### **The practical application of ethical principles (i.e., honesty, respect, integrity, personal conflicts of interest) that underpin health and safety professional codes of conduct**

Health and safety Professional Codes of Conduct usually have four key principles:

- Integrity
- Honesty
- Respect
- Avoiding or managing personal conflicts of interest

The IOSH health and safety Code of Conduct applies principally to the activities of members as health and safety professionals. Members owe a primary loyalty to those at risk and should seek to ensure professional independence in the execution of their duties. In a profession, it is essential that members demonstrate integrity by being honest and acting fairly.

Members must also avoid departing from the standards of integrity, competence, and respect in their private lives in any way that could undermine public trust and confidence in the profession.

#### **Integrity and Honesty**

Health and safety professionals must be honest in discharging their duties as health and safety professionals. Knowingly misleading anybody for financial or other gain that could not have been made honestly is most likely to be unacceptable. Examples include:

- Giving misleading information about qualifications and/or memberships, either to a prospective or current client, to gain or retain instructions, or to a prospective or current employer, to obtain employment or to attain a promotion or enhanced benefits.
- Knowingly incorrect details on policies, procedures, risk assessments, or incident investigations.
- Cheating at exams.
- Plagiarising someone else's work and using it as their own.

Health and safety professionals are also expected to abide with the law at all time. If convicted of a criminal offence, either personal or health and safety related, IOSH require that members inform them immediately. In some cases, IOSH may take disciplinary action against a member, and remove their membership to the Institution.

## **Respect**

Health and safety professionals must have regard to the reputation and good standing of the professional institute to which they belong (e.g., IOSH) and of other members. Conduct that brings them, other members and/or the institute into disrepute must be avoided.

As an occupational safety and health professional disagreements will happen from time to time. To avoid making disagreements personal, it is important to remember that it is often acceptable to offer feedback on ideas but unacceptable to openly criticise individuals, particularly in an offensive manner. Respecting other people includes behaving in an appropriate manner by showing the same respect to a person no matter what their standing, preferences, or background. Inappropriate behaviour includes the use of foul language or acting in an intimidating or threatening way.

Health and safety professionals should respect the rights and privacy of other people and organisations. Respecting an individual's rights will include non-discriminatory comments or behaviour on the grounds of age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, gender, socio-economic and sexual orientation. Race includes colour, nationality and ethnic or national origin.

Professionals need to respect the privacy of the individual by ensuring confidentiality where relevant. Information technology may have an adverse effect on an individual's privacy and so where this is used in employment, advice should be sought on data protection legislation when storing personal information.

## **Avoiding Personal Conflicts of Interest**

Conflicts of interest occur where a health and safety professional's judgement may be affected by more than one interest and what may happen as a result of their involvement.

Here are some examples where there could be a conflict of interest:

1. A dangerous procedure is noted but a shutdown could lead to a loss of income at a time when the organisation is experiencing financial difficulties and may possibly lead to the closure of the company. As this would involve redundancy measures including that of the health and safety professional, there is a conflict of interest - safety versus job security.
2. If acting as a consultant the health and safety professional is aware that recommendations are not being implemented the conflict of interest is whether they continue to charge for advice, knowing that safety is at risk.
3. Conflicts of interest may also arise through the offer or acceptance of inducements such as gifts, hospitality, preferential treatment, and inappropriate appeals to friendship or loyalty. An inducement could affect professional independence of a health and safety professional.

It is important that the health and safety professional remain impartial and are not seen to be influenced in any way.

## **Why Effective Communication is Important**

To achieve success in health and safety management, there needs to be effective communication up, down, and across the organisation. Organisations need to communicate information to their workers on the risk to their health and safety identified in their risk assessments, and the preventive and protective measures necessary to control risk. The information provided should be communicated appropriately, considering:

- Experience

- Level of employment in the hierarchy of the organisation
- Workers' levels of competence
- The size and structure of the organisation

It is essential that whoever is giving information checks to confirm that the recipient has understood. This two-way communication is the way to ensure that information delivery is effective. Effective communication means that people within the organisation understand who to communicate with in given circumstances and know that their opinion is valid. When people feel that their comments and opinions are heard, they feel part of a team and more positive in their role. All of this contributes to a healthy work culture.

The role of the health and safety professional is to ensure that the communication remains effective and that any difficulties are ironed out quickly so that there is no compromise to any health and safety matters being communicated amongst workers.

### **The Need to Consult and Negotiate when Developing Health and Safety Objectives**

Policy and goals are usually set by the organisation's management, whilst the health and safety professional will usually work out the objectives. Whilst the health and safety professional will have some ideas, this should not be an exercise that should be done alone. Stakeholders and workers should be consulted, since they may be affected and it is they who must work together in order to achieve these objectives. It is a legal requirement in the UK that workers are consulted under The Health and Safety (Consultation with Employees) Regulations 1996 as well as the Safety Representative and Safety Committee Regulations 1977. Ideally this should be a two-way consultation to ensure that any concerns are dealt with before commencing any new procedures. However, where timing is critical this may not always be possible but, in these circumstances, regular monitoring should be made using two-way communication to assess any feedback.

People who feel they have helped set an objective will be most motivated to achieve that objective. Consultation with stakeholders will ensure that the objectives are achievable with the existing resources and within the necessary timeframes. If further resources are needed, Senior Management may need to be consulted again to reassess budgets, staff levels and timeframes.

### **Influencing Ownership of Health and Safety at all Levels of an Organisation**

Health and safety professionals can influence ownership of health and safety throughout the organisation via:

- Participation
- Management accountability
- Consultation
- Feedback

Involving the workforce is good management practice to achieve better quality, design, productivity, etc. Where involvement exists, it can be extended to health and safety, and where it does not health and safety may be a good starting point. Without workforce involvement in health and safety management, managers and health and safety professionals may:

- Become detached from the realities of production and prepare procedures and rules which become difficult to comply with, are discredited and ignored
- Respond to incidents by adding more rules and artificial procedures which over time become excessive

It is good practice for the health and safety professional and other managers to occasionally join the workforce and take part in their activities. For example, they could spend a nightshift working on a production line. This will give them some practical experience and understanding of what the workers must go through, what challenges they face, and what control measures are pragmatic.

Another important step to securing ownership is securing management accountability. In organisations with good levels of performance, health and safety is well established as a "line responsibility". That is, managers at all levels, are held responsible and accountable for the levels of safety performance within their own departments. Health and safety is just as much a manager's responsibility as is cost, production, and personnel issues.

Strong consultation processes, like health and safety committees or recognition of worker health and safety representatives, also promotes a positive health and safety culture. An effective consultation process will present information to the workers and their representatives (for example, information on current performance, or proposed changes), and will listen to their views and concerns. An approach which incorporates the views and opinions of the workers is more likely to be accepted and owned by those workers.

Feedback is important. Feedback can help workers and managers get better at what they do. In fact, many people crave feedback, since most people want to do a good job. Most managers do not provide enough feedback or are too vague because they are afraid to be perceived as negative. It is important to be honest, but also to avoid individual blame. Recognise the positive, but do not ignore the negatives. Give feedback on where performance can improve and be consultative in identifying solutions.

### **The benefits of the health and safety professionals engaging with stakeholders**

The lack of consistent application of safety legislation and protocols is a major challenge for the health and safety professional.

The skillset, abilities, aptitude, qualifications, knowledge, and experience of employees and of workforces can be limited and have a lack of preparedness.

Capacity building in health and safety incurs financial costs, and other resources such as PPE, technology, increased and competent supervision are not always given preference by organisations.

It is important for the Health and Safety professional to work with stakeholders to build a proactive Health and Safety culture.

Building a rapport and relationship of trust with stakeholders, and gaining their participation is crucial to move any health and safety efforts forward, which, in turn contributes to business continuity and success. Being respectful to all, listening, learning, and encouraging inclusiveness creates a safe and healthy work environment. By managing the processes through regular interaction, it is possible to influence and control the outcomes of improved health and safety attitudes, behaviours, and actions.

### **Ways that the health and safety professional can understand and influence different stakeholder groups**

An example of how the health and safety professional can understand and influence different stakeholder groups is for example engaging with migrant workers and employees from different cultures, with differing languages, attitudes to safety and inadequate skill level. By delivering Health and Safety it is possible to enhance the understanding of content and enable OSH to be accessible to all.

When information is translated and communicated in local languages, the difference can be seen and felt in engagement with an audience, who will listen attentively with eyes wide open looking at the presentation slides and

engaging by asking questions. Use of symbols, powerful imagery, video clips and specific material to benefit the audience ensures that important safety messages are getting across.

Using different communication methods is paramount to health and safety delivery and keeping employees and workers safe through raising their awareness on health and safety for them and other around them.

### **The importance of receiving and acting on feedback on health and safety performance from all stakeholders**

Many different stakeholders will provide the health and safety professional with feedback on health and safety performance. This could be the workers, through comments on hazards or working conditions. It could be line-managers, through complaints on how much time it takes to comply with health and safety procedures. It could be external stakeholders, such as clients or insurers, who require the organisation to comply with various external standards.

It is important to listen to this feedback but even more important to act on the feedback. If the health and safety professional listens, but no action is visible, they will lose credibility. Not acting on feedback sends an unconscious message that the individual is not important, that their opinions are not valued. This is particularly problematic with worker or manager feedback. If they feel that their feedback is not acted on, or that their suggestions are not valued, they will stop providing feedback. And they are likely to become more resistant to changes in safety management. This generally makes the role of the health and safety professional much more difficult.

When entering a new organisation, the health and safety professional can gain co-operation by seeking feedback and acting on it. If they can identify issues that workers and managers have, provide a quick and simple solution they could gain goodwill and credibility early on in their role. However, this must be a pattern that can be maintained as goodwill and credibility can be lost faster than it is gained.

### **The Use of Different Methods of Communication Media**

Communication to promote health and safety messages within an organisation typically include five types:

- Verbal
- Electronic
- Printed
- Pictorial
- Social (rumours and informal discussions)

#### **Verbal communication**

Effective verbal communication comes from analysing what an individual or audience needs to know, followed by conveying and/or reinforcing that message through the spoken word clearly and concisely. Also, by seeking and using verbal and non-verbal feedback on how a message is received, the speaker increases the likelihood of successful communication. Whenever possible, when the subject matter is short-term or when a direct response is required, face-to-face communication is best. It is also the quickest way to check understanding. Verbal communication is also valuable as part of an overall plan when rolling out a new policy, strategy, or operational system. It is proactive as it does not rely on others receiving and reading a written communication. A recorded verbal presentation can also be the basis for a supporting information cascade to those not present at an initial presentation. The most effective use of verbal communication is when participants can interactively formulate and brainstorm ideas, develop, comment on, and approve plans, discuss changes and agree implementation steps.

Types:

- Meetings
- Presentations
- Lectures
- Toolbox talks
- Workshops
- Informal/formal conversations (face-to-face, phone/videoconference)

### **Electronic communication**

Electronic communication is frequently common now. Organisations make extensive use of emails, intranet systems, shared network drives, and even work-based social media sites. Emails are convenient for communicating non-urgent messages to people, especially large groups of people. They are also very easy to forward on, which makes cascading information through the organisation, down through the management structure, incredibly simple. However, the problem with emails is that many people receive too many of them. It is common for managers to receive hundreds of emails a day, many of them completely unnecessary and irrelevant to them. Since they become overwhelmed by emails (called "email overload"), many of them go unread and are ignored. This means that important health and safety messages should not exclusively be communicated by email. Email is a tool to support communication, not the only tool. Another problem with email is that many workers, such as in manufacturing or construction, do not need an email account and, therefore, do not have one.

Organisations can have intranet websites, which contain much information relevant to topics like safety, quality, finance, human resources, etc. A Health and Safety Team can create their own intranet website, and can display performance indicators, important messages, and downloadable forms and procedures. This is useful for providing people with a shared location to access common documents and information. But it is a poor tool for communicating important messages since most people do not regularly access the Health and Safety intranet site.

Social media use within organisations is growing. There are now several social media sites that target business users and create networks within one organisation. The health and safety professional can use these to communicate important messages across many people at once and can generate very informal online discussion which can be considered part of the consultation exercise.

Examples include:

- Emails
- Intranet/internet
- Social media

### **Printed communication**

Health and safety messages can be printed on paper. These documents can be displayed or given to workers. For example, the minutes of a health and safety Committee meeting can be displayed on noticeboards throughout the workplace. An important change to a Safe System of Work can result in a new Standard Operating Procedure document being printed, and handed to workers, with information on the key changes. The health and safety professional can also use one-off initiatives such as providing workers with handbooks and leaflets with key information.

Written information is useful because it can be referred to repeatedly as required. It also enables each individual to receive the same message, providing much needed consistency in the information delivered. However, written

information can quickly become out of date. Noticeboards may be neglected and ignored if they are not regularly updated. Written and displayed procedures may be revised, and new copies not displayed. Some workers may have poor literacy skills and may have difficulties reading the information. Written information can be backed up with the use of a Toolbox Talk to reinforce the key information points.

Types:

- Procedures
- Risk assessments
- Briefing notes
- Leaflets
- Handbooks, etc

### **Pictorial communication**

Advances in technology have resulted in an increasing use of images, icons, infographics, video, and applications as part of both personal and corporate communications. For corporate communication, visual elements should be used for internal as well as external uses. For example, standard pictograms are widely used to communicate key safety and health messages, but a visual element in other key safety communications is much rarer, e.g., in policy, procedures, risk assessments, routine reports, and so on. The presentation of complex information in a quick-to-digest visual format is an asset to effective communication.

Types:

- Charts
- Diagrams
- Drawings
- Tables
- Graphs
- Displays
- Videos
- Cartoons
- Electronic images
- Photographs
- Pictograms

### **Non-Verbal Communication (Body Language and Actions)**

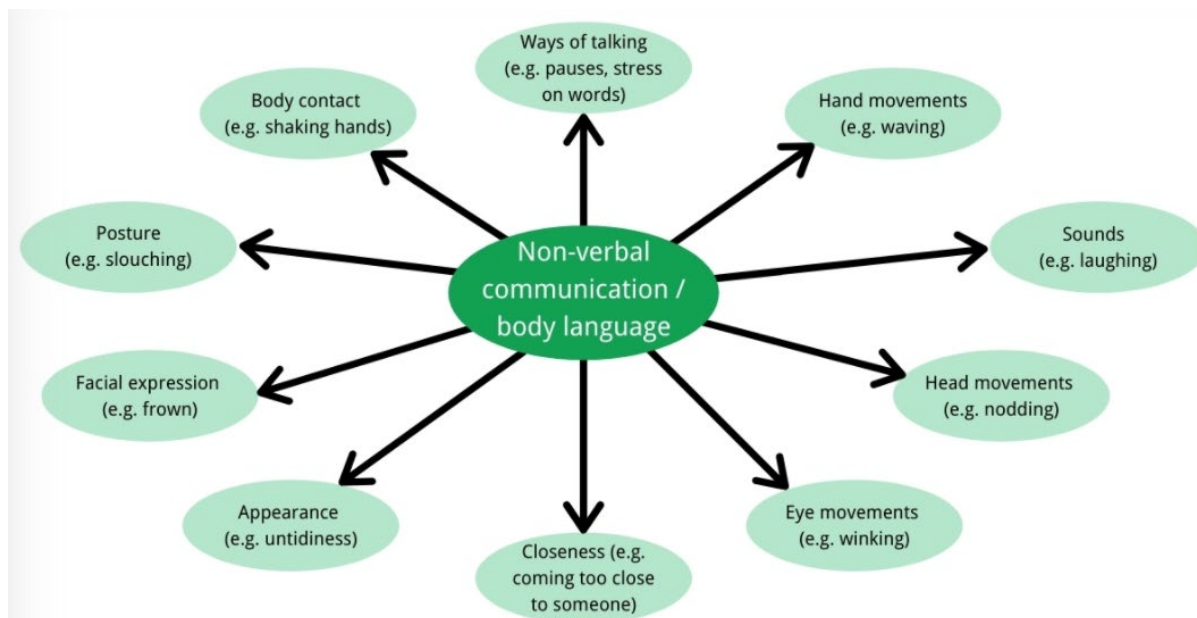
An important aspect of face-to-face and one-to-one communication involves non-verbal elements, often referred to as 'body language'. The health and safety professional need to understand what to look for in others, while making sure their own body language gives the right signals. Body language can back up the words you use and how you say those words but can also betray your true feelings if you are uncomfortable in a conversation. It can be difficult to reverse the 'first impressions' others feel if you display negative body language early on.

Body language is a complex subject matter, but the basics are all that is required along with an open mind. It is important that no conclusions are drawn from body language alone and that the following are considered:

- Whether the conversation matches the type of language the body portrays.



- The situation and context where a conversation is taking place. The person speaking could be cold - this has the same posture as someone who is defensive.
- Other factors such as the level in the organisational hierarchy, profession, culture, disability, health issues.



### ***Types of non-verbal communication***

Health and safety professionals will also be judged on what they do, rather than what they say. Being seen to care and intervening in a dangerous situation sends a much more powerful message than standing in front of an audience and saying how important safety is.

### **Social Communication**

This is often referred to as the 'grapevine'. The 'grapevine' is an informal channel of business communication, so called because it extends throughout an organisation in all directions, regardless of authority levels. Typically, it is more significant at lower levels and/or remote parts of an organisation, as employees use the grapevine when other communication channels are weak or non-existent. The grapevine tends to thrive on 'bad news, rather than good. Rumours and untruths can travel quickly and it is often difficult to trace the source. Smart communicators are aware of the grapevine but rely on 'official' communication channels in their plans. Intentionally using the grapevine will undermine other channels in the longer term and potentially have a negative impact.

#### **Types:**

- Rumour
- Assumptions
- Guesswork
- Misinformation
- Factual (the grapevine can be accurate)

Why an organisation's top management (Chief Executive, Managing Director etc) should be media trained e.g., public attention in the event of a major incident.

With the explosion of social media and the insatiable 24-hour news cycle, it is more important than ever for business leaders to have the confidence and skills to make the most of every media opportunity.

Too many business leaders do not know what to do if a journalist calls and by default miss out on positive media exposure or do their brand damage by saying “no comment” in a major incident.

Media training is about being prepared so that management can respond to proactive and reactive media especially in the event of a major incident.

In these instances, it is crucial that management can successfully protect the reputation of a business.

In addition, media training can improve a Chief Executives/Managing Directors overall presentation skills including body language, finding their natural voice and overcoming nerves and as such feel far more confident in their media skills and public speaking.

### **Procedures for resolving conflict and introducing change**

Whenever people are engaged and committed, conflict and disagreement are bound to happen. This does not mean you must revel in conflict or create trouble just for the sake of it, but it does mean that when conflict happens it's not the end of the world. Quite the contrary, it can even be the beginning of an interesting learning process. The very best and most efficient workplaces are not the ones without conflicts but those who handle conflicts constructively. When a workplace is changing and new ideas are being developed and implemented, conflict is inevitable. There can be no business change without conflict. For example, when an organisation decided to mandate the wearing of safety spectacles on its premises, it was initially met with great resistance from the workforce. Concerns were raised about discomfort, that glasses would make visibility more difficult, that they would mist up, they would make the job less safe, and that long-term use could even damage eyesight! The conflict was resolved after discussion with workforce representatives and by involving them in the change process (they had a big say in the selection of safety spectacles). Consultation at an early stage of a proposed change is an excellent way of preventing conflict.

Once a change has been agreed, then the change process relies on communication. The need for the change must be communicated, along with the reasons why. The health and safety professional will need to be absolutely clear about what to expect. People hate uncertainty. The job of management is to give them as much certainty as possible, and to be as transparent as possible.

During the course of the change, concerns will continue to be raised, and some people will continue to be resistant. As much as possible, these concerns should be listened to and acted upon. Gradually, people will get used to the idea of the change and will begin to accept it.

The health and safety professional and management must continue to monitor that the change remains in place (new systems and procedures) and that it is having the desired effect. It is very useful to feedback to the workers whether the change is working or not. If workers see that the change is effective, this will reinforce acceptance. If the change is not working, management should show some humility and make what adjustments are necessary. This demonstration of humility, and a willingness to admit mistakes and learn, is greatly appreciated by most people, and will gain the management some credibility.

### **Ensuring roles and responsibilities are clear, understood by all workers and implemented**

A key part of a management system is to ensure that all roles and responsibilities have been defined, communicated to all personnel within the organisation and most importantly are understood and implemented. In addition,

organisations should have arrangements in place to make personnel accountable for discharging their responsibilities.

The health and safety professional, in helping to develop a management system will be directly involved in defining safety roles and responsibilities, communicating them to personnel (possibly on induction or through a series of toolbox talks), before checking on implementation by inspection and auditing. Examples of safety responsibilities include:

- **Department manager:** responsible for ensuring that risk assessments are completed. Ensuring that a planned programme of inspections is implemented. Reviewing safety performance at scheduled intervals.
- **Supervisor:** responsible for ensuring workers understand the safety rules. Carries out accident investigations and scheduled inspections.
- **Workers:** complying with safety rules. Wearing PPE as instructed. Reporting health and safety issues. Maintain good standards of housekeeping.

## The health and safety professional's use of financial justification to aid decision making

### The Significance of Budgetary Responsibility, Profit, Loss and Payback Analysis

#### Budgetary Responsibility

Budgets are an integral part of running any business efficiently and effectively. They serve as a plan of action for managers as well as a point of comparison at the period's end.

When most people think of budgets, they think of a typical household budget. Given a certain amount of money, how much should be allocated to various expenses? This system usually works fine for individuals, but in the business world there needs to be a lot more involvement. Determining how much to spend on various expenses is only half the battle. The other half is for a company to be able to effectively judge its spending performance. Regardless of the type of business, the ability to gauge performance using budgets is a matter of life and death in the business world.

Most companies will start with a master, or static, budget. A static budget is a budget with numbers based on planned outputs and inputs for each of the organisation's divisions. It is the first part of budgeting, which determines how much a company has and how much it will spend. These are projected amounts, and the company expects to stay within these limits.

Organisations separate their master budget into smaller, departmental budgets. Individual Department Managers, or Directors, are given the responsibility for managing and spending their budgets. They are known as 'budget-holders' and hold 'budgetary responsibility'. They are monitored by the Finance Department whose job it is to ensure that Departments do not overspend. Therefore, it is quite natural for budget-holders to be quite protective of their budgets, and resistant to making unplanned expenditure.

When a health and safety professional needs to implement a new initiative, which requires financial resources (such as purchase of a new machine, or providing training to certain people), one of the key questions they must ask is "Who will pay for this?" They must identify the correct budget-holder. That person becomes a key stakeholder and must be persuaded to spend the money. In many cases, the expenditure has not been planned for, so this conversation can be difficult. It is for this reason that health and safety professionals must be persuasive.

## Profit and Loss

Commercial organisations exist to make a profit, and to transfer the profits to shareholders who own the business. This requires organisations to keep a track of what money is coming in, and what money is going out. The difference is the profit, or the loss. Even non-commercial organisations must keep track of this, or they will lose money and be unable to pay their bills, eventually closing down.

A profit and loss account shows the business's financial performance over a given time, e.g. one year.

For example,

- Sales revenue: £80,000.
- Less costs of sales: £50,000.
- Gross profit: £30,000.
- Less other expenses: £20,000.
- Net profit: £10,000.

The Profit and Loss account shows the business has made a gross profit of £30,000 before taking into account other expenses, such as taxes. After those expenses, the net profit is £10,000.

Capital expenditures (CAPEX) and operating expenses (OPEX) represent two basic categories of business expenses. They differ in the nature of the expenses, and in their respective treatments for tax purposes.

Capital expenditures are the funds that a business uses to purchase major physical goods or services to expand the company's abilities to generate profits. These purchases can include hardware (such as printers or computers), vehicles to transport goods, or the purchase or construction of a new building. The type of industry a company is involved in largely determines the nature of its capital expenditures. The asset purchased may be a new asset or something that improves the productive life of a previously purchased asset. If the asset's useful life extends more than a year, then the company must capitalise the expense using depreciation to spread the cost of the asset over its designated useful life as determined by tax regulations. Capital expenses are most often depreciated over a five to 10-year period but may be depreciated over more than two decades in the case of real estate. Buying a new Mobile Elevating Work Platform is a CAPEX. It is a large piece of equipment, which retains its value when purchased, and slowly depreciates over time. When health and safety PROFESSIONALS wish to purchase large items like this, they must submit a CAPEX request. However, the maintenance and upkeep of the equipment is an operating expense which needs to be worked into future annual budgets.

An operating expense results from the ongoing costs a company pays to run its basic business. In contrast to capital expenditures, operating expenses are fully tax-deductible in the year they are made. As operational expenses make up the bulk of a company's regular costs, management examines ways to lower operating expenses without causing a critical drop in quality or production output. Sometimes an item that would ordinarily be obtained through capital expenditure can have its cost assigned to operating expenses if a company chooses to lease the item rather than purchase it. This can be a financially attractive option if the company has limited cash flow and wants to be able to deduct the total item cost for the year. Hiring or leasing a Mobile Elevating Work Platform is an OPEX.

Capital expenditures are major purchases, and because their costs can only be recovered over time through depreciation, companies ordinarily budget for these purchases separately from preparing an operational budget.

## Payback Analysis and Periods

The payback period is the length of time required to recover the cost of an investment. The payback period of a given investment or project is an important determinant of whether to undertake the position or project, as longer payback periods are typically not desirable for investment positions.

Payback period in capital budgeting refers to the period of time required to recoup the funds expended in an investment, or to reach the break-even point. For example, a £1000 investment made at the start of year 1 which returned £500 at the end of year 1 and year 2 respectively would have a two-year payback period. Payback period is usually expressed in years.

Payback period intuitively measures how long something takes to "pay for itself." All else being equal, shorter payback periods are preferable to longer payback periods.

Payback periods are an important consideration in health, safety, and environmental management, often with respect to energy efficiency technologies, maintenance, upgrades, or other changes. For example, a compact fluorescent light bulb may be described as having a payback period of a certain number of years or operating hours, assuming certain costs. Here, the return to the investment consists of reduced operating costs.

The payback period is important because it helps justify spending money. It is a valuable tool for the health and safety professional because they might be able to show that spending money on health and safety can actually save more money than is being spent. You might be able to show that spending £15,000 a year on extra PPE will prevent an average of 6 accidents, saving the organisation an average total of £23,000. The key is to gather the correct financial information, estimate the costs of not implementing these measures, estimate their costs based on known information (the more accurate, the more credibility your analysis will have), and estimate any efficiency or productivity improvements there will be.

Long-term and short-term budget planning when making decisions (terotechnology).

Terotechnology is applied to physical assets to determine an economic life cycle analysis via a combination of:

- Management
- Financial
- Engineering
- Other practices

It is used for:

- Budgets
- Procurement
- Acquisition
- Design

The areas covered are:

Acquisition	Construction and commissioning
Operations	Operating costs / Generating / Production
Scheduled maintenance	
Unscheduled maintenance	
Conversion/decommissioning	Decommissioning and/or demolition

Life cycle "cost trees" are used to determine the above areas. These consist of flow charts that cover all areas within the sections to ensure that a full and detailed analysis can be drawn up.

It pushes Professionals to look at the acquisition vs sustainability costs when considering projects, systems, and new equipment. It includes the Life Cycle Costing (LCC), and this is a financial and risk profile that is completed to ensure that the best course of action is followed.

It is based on an accounts process which incorporates procurement and budgeting. There are ten stages to life cycle analysis:

1. Defining the problem
2. Develop cost breakdowns for repair, replacement and sustaining
3. Select which costs are more appropriate
4. Gather estimates and models for the selected costs
5. Produce annual cost profiles for set number of years (usually 5 or 10)
6. Develop charts to show for any comparison with alternative suggestions
7. Map any high expenditure costs and why they exist
8. Analyse the reasons behind the costs
9. Risk profile the high costs and occurrences
10. Select the preferred course of action

This process can be applied to most areas in health and safety management to determine exactly what costs are expected with an intended course of action. This can then be used to judge whether it is feasible by using a cost-benefit analysis against the results.

### **Recognising and Influencing the Responsible Budget Holder**

As previously mentioned, it is important to identify the appropriate budget holder. They will need to be persuaded to make the best health and safety decisions. These decisions will affect their budget. Budget-holders can be influenced by the following arguments:

- The cost of implementing the change is outweighed by the financial savings to their Department and organisation.
- The health and safety decision will lead to productivity increases e.g., will make work faster or easier. This is even more convincing when the productivity increase has been quantified and is based on accurate assumptions and information.
- The expenditure is necessary to comply with legislation. The organisation can be prosecuted or sued if they fail to comply.

- The budget-holder themselves can be prosecuted as an individual, risking fines or even jail.
- The organisation's health and safety policy requires this decision to be made. They are the person responsible for the decision.
- Failure to act will lead to accidents. A description of the Departmental consequences of the accidents can help persuade a reluctant manager, such as the impact on project deliveries, or the time taken by managers to investigate and fix any damage.
- Escalating the matter to senior management is mostly a last resort, since that means going over the Department Manager's head. But the issue can be raised in formal management reports, highlighting an increased risk, potential breach of the law, and the necessity to invest in this area. The influence of the Board or Senior Management may help unlock the decision.

### **Cost-benefit analysis in relation to risk control decisions (organisational, design, planning, operational)**

In a CBA, all costs and benefits are expressed in a common currency, usually money, so that a comparison can be made between different options. It is a defined methodology for valuing costs and benefits that enables broad comparisons to be made between health and safety risk reduction measures on a consistent basis, giving a measure of transparency to the decision-making process.

In undertaking a CBA, all relevant costs which accrue from the inputs into a health and/or safety intervention must be identified and costed. Inputs are defined as any additional human, physical, and financial resources that are used to undertake an intervention. For example, the initial costs of the equipment, the initial costs of the training, and the ongoing costs of maintaining the equipment, and the ongoing cost in management time to supervise and manage this.

Likewise, all relevant health and safety and non-health and safety benefits arising from the intervention must be identified and expressed in monetary terms. Health and safety benefits include the avoidance of costs that would be incurred if the intervention does not go ahead, such as estimated number of accidents and the resulting costs such as sick pay, damage to equipment and materials, compensation, fines, costs of enforcement agencies, lost management time, replacement workers, etc. Non-health and safety benefits are savings, such as productivity increases or additional sales, and should be included in the CBA as an offset to the duty-holder's costs.

### **Example**

A simple method for cost screening of measures is presented below. This puts the costs and benefits into a common format of '£'s per year' for the lifetime of a plant.

Consider a chemical plant with a process that if it were to explode could lead to:

- 20 fatalities
- 40 permanently injured
- 100 seriously injured
- 200 slightly injured

There is HSE and international data which estimates the financial cost of fatalities and injuries. The data we are using says:

- Fatalities cost £1,336,800 each
- Permanent injuries cost £207,200 each



- Serious injuries cost £20,500 each
- Slight injuries cost £300 each

The rate of this explosion happening has been analysed to be about  $1 \times 10^{-5}$  per year, which is 1 in 100,000 per year. The plant has an estimated lifetime of 25 years.

How much could the company reasonably spend to eliminate (reduce to zero) the risk from the explosion?

If the risk of explosion were to be eliminated the benefits can be assessed to be:

Fatalities:	20	x £1,336,800	x $1 \times 10^{-5}$	x 25 years	= £6684
Permanent injuries:	40	x £207,200	x $1 \times 10^{-5}$	x 25 years	= £2072
Serious injuries:	100	x £20,500	x $1 \times 10^{-5}$	x 25 years	= £512
Slight injuries:	200	x £300	x $1 \times 10^{-5}$	x 25 years	= £15
Total benefits:					= £9,283

The sum of £9,283 is the estimated benefit of eliminating the major accident explosion at the plant on the basis of avoidance of casualties. This method does not include discounting or take account of inflation.

For a measure to be deemed not reasonably practicable, the cost has to be grossly disproportionate to the benefits. This is taken into account by a disproportion factor (DF). In this case, with many fatalities, the DF will reflect that the consequences of such explosions are high. A DF of more than 10 is generally unlikely. Since the consequences are catastrophic, we will apply the maximum DF of 10.

Therefore, it might be reasonably practicable to spend up to somewhere in the region of £93,000 (£9300 x 10) to eliminate the risk of an explosion.

This type of simple analysis can be used to eliminate or include some measures by costing various alternative methods of eliminating or reducing risks.

## Internal and External Sources of Information when Determining Costs

Internal sources of information regarding costs can include:

- Accident records, which can show past numbers of accidents. The investigations may also have a calculation of the cost of each accident.
- Human resources department, for information on length of absence, and recruitment costs.
- Finance department, for information on sick pay.
- The maintenance department, to find out what maintenance is required, length of time this would take, and how much it would cost.
- Procurement department, for initial costs of purchasing.
- The production department may be able to comment on how much time certain health and safety changes would take on an ongoing basis. Or perhaps what productivity increases could be expected.
- The legal team can provide information on compensation claims, and their costs.

External sources of information for cost calculations include:

- Insurance companies, who can provide data on claims, premiums, and potential increases or savings.
- Enforcement agencies, who can advise on levels of possible fines.

- Manufacturers' instructions, for information on what maintenance is required on new or existing equipment. They may service equipment, which is an ongoing cost.
- Enforcement agencies can also advise on the estimated value of human lives. For example, the HSE can provide estimates for fatalities, injuries, and ill-health here:

### **Short and Long Term Budgetary Planning when Seeking Approval for New Initiatives, Projects, and Campaigns**

As we have previously highlighted, each health and safety initiative will incur both immediate (short-term) and ongoing (long-term) costs and benefits. When seeking approval for these initiatives, both types of costs must be budgeted for. In many cases, the longer-term costs may be much higher than the initial costs. For example, the initial cost of providing PPE to workers is quite low. But the PPE must be regularly replaced, and this is a significant longer-term cost. Furthermore, supervisors must spend time enforcing PPE compliance and training or disciplining people who do not wear it. This is a cost in supervisory time, which ultimately could contribute to needing to recruit additional supervisors in the long-term.

Costs are usually relatively easy to quantify. However, benefits can be quite difficult to quantify, and often rely on assumptions. When seeking approval for a new initiative, you will need to estimate and quantify both your short and long-term costs, and the benefits. When using assumptions in your calculations, you should explain what these are. Your assumptions may be incorrect, and these can be challenged by management.

## Learning outcome

- **7.1-7.3:** You will be able to develop a health and safety policy strategy with your organisation (including proactive safety, Corporate Social Responsibility, and the change management process).

## 7.1: Societal Factors

### Economic climate, government policy and initiatives

#### Economic Climate

The global and local economic climate has a large influence on health and safety management. When the general economic climate is poor then sales decline and businesses will try to cut costs.

When looking for ways to cut costs, management will often look at easy targets, the departments which cost money but are not seen to produce any profit, such as health and safety, quality, maintenance, etc. Unfortunately, this is short-sighted because cuts in those areas can affect long-term performance and profitability. Nevertheless, in desperate situations, many companies take drastic measures and short-term savings can be made.

Some of the consequences can include:

- Reduction in Health and Safety budgets, leading to fewer improvements and reduced levels of monitoring.
- Reduction in numbers of qualified health and safety professionals.
- Reduction in the number of workers and operators, so fewer people are available to do the same job. This means that people must work harder and faster, leading to an increase in the number of errors, shortcuts being taken, rules broken, along with an increase in stress and fatigue which can lead to further mistakes.
- The reduction in staffing levels also leads to people working longer hours and taking fewer breaks, rest days, and holidays. This leads to increased levels of fatigue and stress.
- The increase in working hours increases exposure to many hazards and increases the risk of injury and ill-health. For example, a worker who spends 50% more time exposed to a chemical hazard is more likely to develop an ill-health condition.
- Reduction in health and safety training provision, due to budgets being cut or due to non-availability of people because they need to be at work.
- Less chance of capital expenditure requests being approved for safer equipment.
- Decreased levels of maintenance, increasing the likelihood of failure and breakdowns.
- With the potential for job losses, workers, and health and safety professionals, may feel pressurised to ignore safety rules and not challenge safety breaches for fear of losing their jobs.
- Organisations may be tempted to take more risks by carrying out work or projects without spending time and money on the correct safety precautions.

However, a weak economic climate can have positive side-effects:

- In the years following the 2008 financial crisis there were fewer workplace fatalities because many large construction projects were delayed or cancelled and there was generally less industrial activity in the world.
- There may be increased levels of safety compliance from workers if they fear disciplinary reprisals (for example, for not wearing PPE or for not following safety rules). This is because a poor disciplinary record can be used when selecting people for job losses.

## Government Policy and Initiatives

### Policies

Government policies can be introduced and can significantly change the regulatory environment within which industry operates. A government may choose to change its policy at any time. Often it is as a result of some type of change. For example, a major disaster, or a change in government and approach. Government's policy on safety risks can introduce or decrease the regulatory burden on industries, depending on which industries are considered a priority.

For example, as a result of the economic crisis and cost cutting exercises, the UK HSE are focusing their inspection activities on construction workplaces. This is quite simply because they lack the financial and human resources to inspect all types of workplaces, so they are concentrating their efforts on the highest risk industries.

Another example of a shift in government policy is where the UK government introduced the 'Fee for Intervention' scheme. This allows the HSE to recover the costs of its activities from those who are in breach of legislation. The fee is £157 per hour, per member of the HSE team. The final bill can be quite expensive.

However, changes in policy can be beneficial to industry. For example, a new government could decide that there is too much legislation and regulation, and that this is restricting economic growth by encouraging too much bureaucracy. Therefore, regulations could be relaxed, responsibilities removed, and this may be a positive change for organisations.

### Initiatives

Governments will often support legislation with initiatives to raise awareness and improve health and safety. In some cases, an initiative is launched at the same time as new legislation to encourage organisations to be prepared and comply.

In other cases, the government may launch an initiative even though there is no supporting legislation. The organisations are encouraged to voluntarily work to improve their management of a particular type of risk. This is particularly helpful when the legislation has not yet been agreed, but there is still an urgent need to act.

Initiatives are launched to focus on a specific type of risk or occupation. Therefore, each initiative will have a 'theme'. For example, in 2014 the UK's HSE launched the 'Beware Asbestos' campaign, which sought to raise awareness amongst tradespeople of the risks from asbestos and how to protect themselves. This was a purely informational initiative. However, some initiatives can be more directive, such as a temporary ban on outdoor construction work between 12pm and 4pm in a summer heatwave. Other initiatives might be a temporary increase in enforcement inspections in a particular industry. Initiatives are launched because a risk of harm has been identified, and it is deemed necessary or desirable to launch a temporary effort to reduce the risk.

### Industry and Business Risk Profile

The industry and business risk profile of a country can have an influence on health and safety standards. A country whose main industry is the extraction of oil will have a risk profile that presents very different risks to that of a country whose principal industry is manual manufacturing. The extraction of oil is a skilled and high-risk process. If it is not managed correctly, there is the possibility of a major disaster, such as explosions and large-scale pollution incidents. However, a manual manufacturing industry, such as textiles or food packaging, is 'high volume and low profit'. The highest risk is not because of the hazards of the industry, but instead from the high numbers of people employed and the speeds at which products are produced. The severity of any consequences will be much smaller,

but the number of people affected will be higher. A major oil refinery will be very visible and obvious to everyone in society. However, large numbers of textile workers with minor injuries might not get the same attention or be given the same level of priority as a major disaster.

Each type of industry brings with it its own unique challenges and risks. These diverse risk profiles will influence societal decisions to introduce standards to manage the risks these industries create. The risk profile will significantly affect what a country determines to be its health and safety priorities. For example, a country with a lot of heavy industry and manual activities will be unlikely to consider the ergonomic risks from display screen equipment as a major priority.

As technology advances new industries develop. Emerging industries may not have experience of the health and safety risks they create to understand what standards are needed. The health and safety impact may take many years to become apparent, and then it may take even longer for society to take action. For example, we started to understand the potential health risks of asbestos in the 19th century, but action was only taken to ban it in the late 20th century. In some countries it is still widely used. Therefore, the evolution of health and safety standards can take place over many decades.

### **Globalisation of Business**

Globalisation is the growing interdependence between the economies and businesses of different countries. Globalisation has been growing for centuries and in particular since the end of World War II. It is driven by many factors, but key amongst those that have driven the major increase over the last decade or so are improved communications, cheap travel and transport, deregulation of trade barriers and development within individual economies. The tendency of large organisations to buy smaller organisations to gain access to new markets has created extremely large global corporations.

### **Influence of Global Corporations**

These global corporations can employ hundreds of thousands of people around the world and, despite their reputation as tax avoiders, generate huge amounts of wealth and tax which benefit the economy and citizens. As a result, they are highly influential, and have the power to lobby governments by either promising to invest and bring jobs to a country, or by threatening to take their jobs to another country.

### **Shifting Production to New Countries**

The ability of corporations to move their manufacturing plants and offices to a different country allows them to reduce their costs by basing them in countries where wages, employment conditions and safety standards are lower (such as moving production from the USA to China).

In many cases, this means that health and safety standards are also exported and imported. A British corporation setting up a new factory in India may "export" British safety standards and follow these instead of the lower local standards. Whilst there is still a cost saving for the company from paying lower wages, the corporation might have a global commitment to protect all of its workers from harm, including Indian workers.

The opposite can also be true. If an American corporation purchased a workplace in the United Kingdom, the new American managers might not be familiar with the high level of British safety standards or the British legal requirements and might wish to manage safety in the way it is managed in the USA.

## **Working Patterns and Time Differences**

A global economy can also affect our working patterns. Office workers and managers feel the pressure to always be available to answer emails and telephone calls from colleagues and customers in other parts of the world. The time differences can disrupt our work/life balance. The need to deal with other cultures and other languages places additional psychosocial demands on workers.

## **Migration**

Globalisation affects migration of workers from one country to another. Migrant workers (which we will discuss shortly) can be at higher risk than indigenous workers. Illegal migrants could be at higher risk still.

The increasing length of supply chains, as goods made overseas pass through complex outsourcing networks, makes it difficult to monitor the quality, authenticity, and traceability, which could lead to health and safety problems resulting from their use. The lack of customs checks across the EU could add to difficulties. Cheap imports or counterfeit goods are a large problem, especially with regards electrical devices which often pose a fire risk because they have not been manufactured to a safe standard. Once these unsafe products have entered the EU market, they can move freely around the EU block with no safety checks.

## **Benefits of Globalisation**

However, generally speaking the globalisation of business has resulted in an overall increase in safety standards. Conditions in developing countries are slowly improving thanks to the increased levels of income, employment, education, and the ever-growing exposure to the high levels of safety in developed countries. Thanks to globalisation and free trade, the percentage of people living in poverty has halved over the past 30 years despite a large increase in total population. Living standards and working conditions are improving across the world. Furthermore, global corporations are often subject to the societal expectations of their clients, and therefore will wish to ensure that good working conditions are available throughout their supply chain. For example, we have seen Apple put under pressure to ensure better standards of work at their supplier Foxconn's factories.

Compared to small local organisations, large multinational corporations have higher safety standards, so they will often improve the safety standards of the companies they take over. They also influence societal opinions relating to health and safety by showing that high standards are achievable.

## **Migrant Workers**

With the development of cheap travel there are more and more 'migrant workers'. A migrant worker is any person who has moved to a different location to work. In some cases, they have moved to a different country. In other cases, they are seasonal workers who are moving within their own country. The ILO has estimated that there are approximately 115 million migrant workers in the world. The definition of migrant workers does not include refugees, asylum seekers, or international students. However, these types of people are often vulnerable to the same health and safety issues.

Migrant workers in the UK originate mainly in the former Soviet bloc countries, such as Poland, Latvia, Romania, and other Eastern European countries. As the EU has enlarged to include these countries, this has given these populations the right to move freely within the EU and work in any EU country. This has caused high levels of migration towards Western Europe (such as Germany, France, and the UK) where working conditions are generally better, and wages are much higher. Other migrant workers might enter the country and work illegally.

Migrant workers are not just restricted to the western countries like the UK and USA. The United Arab Emirates (UAE) is a major destination for migrant workers. It is estimated that up to 80% of the UAE's population is made of migrant workers, mainly of South Asian origin such as India. In fact, South Asia has been a major source of migration towards not just the UK, USA, and Australia, but also towards the Middle East. After the UAE, Saudi Arabia, Oman, Qatar, Kuwait, Malaysia, and Bahrain are common destinations for Indian workers.

Migrant workers are often at a higher risk of work-related injury and ill-health for many reasons.

Migrant workers may have different experiences of health and safety regimes in their countries of origin. For example, if migrating from a country with a lower standard of safety the migrant worker will be unfamiliar with the expected standards of safety in their host country. The opposite is quite true also. A worker entering a foreign workplace with a lower standard of safety may expect to be safe when they are not. It is often necessary to provide additional training and supervision to migrant workers whilst they adapt to the new expectations of their job. Their lower expectations of working conditions also make them vulnerable when working in the illegal or informal economy, where they might be asked to work in dirty, dangerous, and humiliating conditions.

The potential for exploitation and subjecting migrant workers to very low standards of safety. The UAE and Qatar in particular have earned a poor reputation for their treatment of migrant workers since they are not covered by the same labour rights as native citizens. However, exploitation can also occur in Western countries. One incident in the UK was when 21 exploited Chinese workers were drowned by the incoming tide when picking cockles (a type of edible mollusc) on a beach.

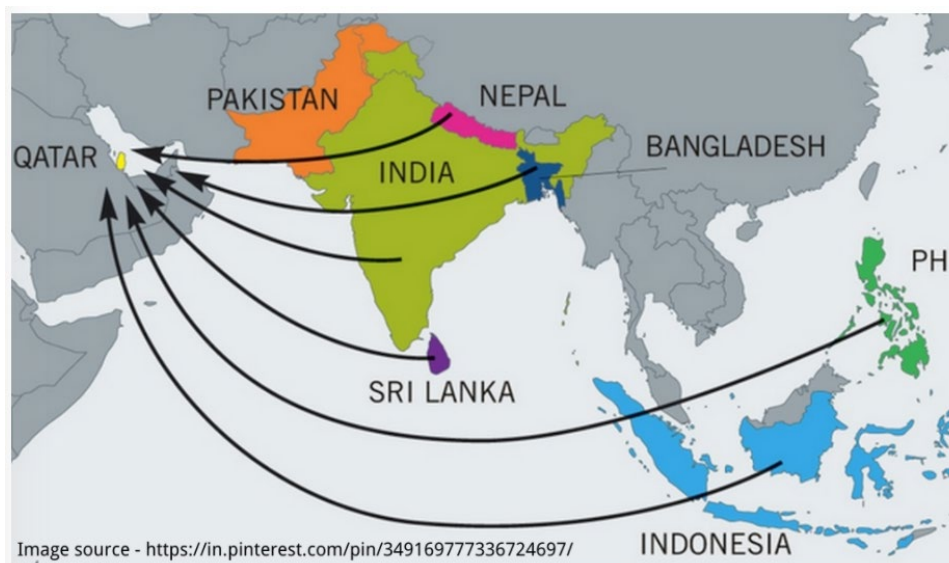


Image source - <https://in.pinterest.com/pin/349169777336724697/>

### ***Origin of most migrant workers in Qatar***

Migrant workers are also generally considered quite hard working in comparison to the indigenous population. This means they are more likely to work long hours in an attempt to earn as much money as possible in the shortest time. They will also be prepared to take on higher risk work and will tolerate lower working conditions. This motivation can make them vulnerable to exploitation, and their positive attitude can lead to them taking unnecessary risks and shortcuts.



The main health and safety difficulties when working with migrant workers are:

- Language and cultural differences can make it difficult to communicate effectively with other workers and with supervisors, particularly in relation to their understanding of risk. Employers often have to provide safety signs in multiple foreign languages to communicate safety rules. Translators may also need to be provided in training sessions, whereas managers may need to be able to speak the language of the workers to communicate clearly.
- Failure of employers to check on their skills for work and on their language skills.
- Their lack of knowledge on their rights and how to raise issues they may have.
- Migrant workers are unfamiliar with the local health and safety rules and practices, and therefore may unintentionally break the rules unless they are well trained and supervised.
- Because migrant workers are often hard-working and keen to earn extra money, they may have a tendency to take more risks.

### **National Level of Sickness Absence**

Many societies which provide welfare payments, in the form of sickness or disability benefits, will be aware of levels of sickness absence in general. This is because society, in the form of the State and the Taxpayer, will have to finance the cost of these sickness payments. This increases the cost of living for all.

As we have seen in the first learning outcome, by recording the levels of work-related injuries, diseases, days lost, and work-related sickness absence, governments can calculate the total cost to society of poor health and safety management. Where the cost of sickness absence is high, governments will always want to reduce this. This is especially true when there is a trend of absence amongst critical or highly skilled workers. Absences and incapacities can be long-lasting and can affect large numbers of people.

In countries without welfare provision, then it becomes as much of a moral factor as an economic factor. Society will be displeased when huge numbers of people are incapacitated by work-related injuries and diseases, and unable to provide for their families.

The economic factor is significant. Not only might society have to pay the cost of welfare and sickness benefits, but sick people earn less money. This means they will pay less tax on their earnings, purchase fewer products due to a restricted budget (which again means less tax paid) and overall will become a drain on the economy. The World Health Organisation has demonstrated in several studies of the link between high levels of sickness absence and a negative impact on economic growth and tax revenues.

For these moral and economic reasons, there comes a time when society and government will apply pressure on industry to improve their health and safety standards to reduce levels of sickness absence.

### **Incapacity**

The term 'incapacity' is generally used in relation to work and benefits and is typically defined as something like the inability to work associated with sickness or disability (Waddell and Aylward, 2005)

Certain people can be treated as incapable of work. These include:

- Those with prescribed severe medical conditions
- Those who have a long-term infection
- Those who are hospital inpatients

- Those who are receiving long term treatments, for example Cancer treatment

Normally evidence of incapacity is around a person proving that they are incapable of performing in their own occupation because of some specific disease or bodily/mental disablement.

However, it does not mean that an employer cannot make reasonable adjustments to ensure that the person who is incapable of performing in their current occupational cannot be retrained, develop new skills to enable them work in another form of occupation within the workplace. With the right advice and support someone who is incapable in their current work may be able with the right support to function in another role.

Having said that, it may be that because of a medical condition/long term treatment that any form of work is not viable and therefore a worker may be deemed to be incapacitated for work and may need to receive financial support in terms of benefits or giving the option of ill health retirement depending on their age.

### **Societal expectations of equality (such as adjustments for workers with disabilities)**

Equality is about ensuring that everyone is treated fairly and equally regardless of age, sex, disability, race, religion, or sexual orientation.

In terms of general policy, organisations must:

- Treat all workers and the public fairly
- Create an inclusive culture for all workers
- Ensure equal access to opportunities for all people
- Enable all people to develop their full potential
- Equip everyone with the skills to challenge inequality and discrimination in their work environment
- Ensure policies, procedures and processes don't discriminate

The 20th and 21st centuries have seen huge progress in the area of equality. Society's expectation of equality for all people is increasing and this has had a massive influence on both governments and organisations. For example, social movements demanding equality for black people eventually overturned laws permitting segregation in the USA in 1968, and the Apartheid system in South Africa in the early 1990s. Our expectation for equal rights to all people has extended to genders, sexualities, religions, beliefs, ages, and much more. It continues to be a very relevant topic, with issues of discrimination appearing regularly in the news and social media.

As health and safety professionals our work influences the physical environment and layout of the building. We, therefore, need to be particularly mindful of the impact on those with disabilities so we do not accidentally discriminate against them and make the workplace less accessible. We are also responsible for their safety, and the methods of evacuating people with disabilities are an important consideration when designing fire procedures.

The area of equal rights for disabled people has witnessed the creation of several organisations who campaign for improved rights for disabled people. The specific goals of these rights movements are to secure:

- Accessibility and safety in transportation, architecture, and the physical environment
- Equal opportunities in independent living, employment, education, and housing
- Freedom from abuse, neglect, and violations of patients' rights

In many countries, legislation has been introduced in order to secure these opportunities and rights.



***Ensuring access for all people, including those with physical disabilities, is a major consideration when designing buildings***

For people with physical disabilities, funding, accessibility, and safety are the primary areas of difficulty. Access to public areas, such as streets and public buildings and toilets, is one of the more visible changes brought about in recent decades.

Other changes that have occurred include installation of lifts and wider doorways and corridors in buildings to allow for wheelchair access. On road crossings, dropped curbs and tactile paving is used to allow wheelchair users and those with visual impairments to identify pedestrian crossings to cross roads safely.

The elimination of unnecessary steps where ramps and elevators are not available allows wheelchair users and those with other mobility impairments to use public pavements and public transport more easily and more safely.

In 1995, after extensive activism by people with disabilities, the Disability Discrimination Act was passed. This law makes it illegal in the UK to discriminate against people with disabilities with regards to work, education, and transport. This Act was revoked and was replaced by the Equality Act 2010.

For Americans, the movement for rights for people with disabilities began in the 1960's. By 1990, the Americans with Disabilities Act (ADA) came into force, to be amended in 2008 to the Americans with Disabilities Act Amendments Act (ADAAA). These Acts provide full protection for people with disabilities.

In terms of safety, the employer's legal responsibility is to ensure the health and safety of all employees, including those with disabilities. It can include such things as the development of PEEPS (Personal Emergency Evacuation Plans).

## **7.2: Corporate Social Responsibility**

### **What is Corporate Social Responsibility (CSR)?**

CSR is based on the integration of economic, social, ethical, and environmental concerns in business operations.

The major social concerns include the welfare of the key stakeholders in the business, especially workers.

Occupational Health and Safety (OHS) forms an integral part of CSR.

An important aspect of CSR is that it requires businesses, in addition to seeking to maximise profit, to exert a positive impact on society. In essence this means that businesses must go beyond just compliance (legal or otherwise).

### **The four types of CSR**

#### **Philanthropic**

Some of the largest, global organisations are aligned with philanthropic efforts. For example, Microsoft works closely with the Bill and Melinda Gates Foundation to bring technology to communities around the world. Microsoft appreciates that to remain successful, not only continued innovation is required, but also the building of future generations that understand, use, and can improve.

Even small organisations benefit from getting involved with philanthropic causes. For example, hotels holding fundraising nights where proceeds benefit a local school or charity. Supporting these causes is also good marketing. The community is basically “invited into the business”, has a good experience, and sees the organisation in a positive light.

#### **Environmental protection**

Environmental issues appear regularly in the media. It can be a recurring theme, such as climate change, or a significant localised issue such as an oil spill. Many organisations relate to these issues, and public concerns, by taking action to reduce their operational effects on the environment. For example, reducing their overall carbon footprint.

Whilst the larger organisations attract a lot of the attention, there are plenty of opportunities for small businesses to play their part. For example, having programmes for recycling, use of “green” cleaning chemicals, use of alternative energy sources such as solar or wind.

Organisations can also ask their suppliers to do the same, by advising them that their environmental measures will be a factor in your purchasing decisions. By doing so, environmental commitments are multiplied along the supply chain.

#### **Organisation diversity**

Organizational diversity in the workplace concerns the total makeup of the employee workforce and the amount of diversity included. It refers to differences in personal traits, including as age, gender, race, ethnic origin, religion, and education.

Many organisations realise that diversity in the workplace is advantageous when everyone works in harmony and as a team. However, policies must apply to all employees at all levels of the organisation. The Harvey Weinstein scandal demonstrated that no organisation is immune to the ramifications of sexual harassment.

Organisation should regularly review their own diversity policies and protocol to address any complaints and violations. This may not only enhance an organisations image and reputation, but it can also help to build a positive company culture with good morale and high productivity.

### **Volunteering commitments**

Local charities and communities are always in need of help and support. Smart business leaders are aware that being involved in the community is also good for their organisations. For example, picking a local cause (for example a local hospice) to be the beneficiary of funds raised from an organisation achieving a health and safety milestone, and sending a representative along to present a cheque, sending representatives into local high schools to give a talk on a specific topic, such as career options and paths in their organisation.

Business leaders can choose where to spend volunteering efforts to best help both the local area and their organisations. The important thing is for them to choose a cause and contribute time.

### **The benefits for organisations from CSR**

Corporate social investment can help an organisation build a reputation as a responsible business. This can lead to competitive advantage.

Organisations often favour suppliers who have responsible policies, as this can “show them in a good light” to their customers. Some customers do not just prefer to deal with responsible organisations - they insist on it.

Other potential benefits of CSR to organisations include:

- better brand recognition
- enhanced business reputation
- customer loyalty (and increased sales)
- improved financial performance
- greater ability to attract talent and retain staff
- organisational growth
- easier access to capital (investors are more likely to back reputable organisation)
- attract positive media attention

## 7.3: Organisational change

### Why organisational change needs to be effectively managed

Many organisations face continuous pressure to change in order to meet their business objectives in a competitive marketplace. Industry undergoes increasing change and there has been, and will continue to be, pressure for organisational change and staff reductions.

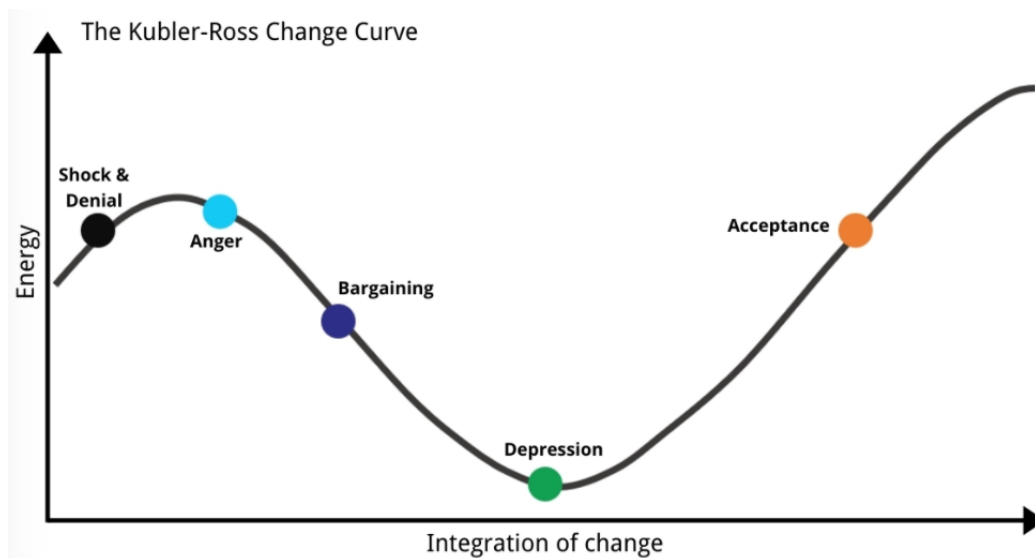
Organisational changes such as reducing staffing levels, using contractors or outsourcing, combining departments, or changes to roles & responsibilities are usually not analysed and controlled as thoroughly as plant or process changes. Such changes can however, if inadequately conceived or implemented, have a detrimental effect on safety. Even subtle changes to organisations can have significant impacts on the management of hazards.

Rapid or continuous change can also have a detrimental effect on workers' health and poorly managed organisational change can increase the workforce's exposure to mental health issues.

### Use of the Kubler-Ross Change Curve to manage the change process

Elisabeth Kübler-Ross was a Swiss-American psychiatrist, a pioneer in near-death studies, and author of the internationally best-selling book, *On Death and Dying* (1969), where she first discussed her theory of the five stages of grief, also known as the "Kübler-Ross model" or "change curve".

The 'change curve' describes the internal emotional journey that individuals typically experience when dealing with change. This involves a number of stages that people go through: shock and denial, anger, bargaining, depression and acceptance.



**Shock:** After the initial shock of being told about a change, there is often by people to the change as if to say the change is unnecessary. A type of "this can't be happening" or "not again!" moment.

**Anger:** When people realise that the change is real and will affect them, the denial usually turns to anger. People get angry and look to blame someone or something else for allowing this to happen. A type of "No! I can't accept this!" moment.

**Bargaining:** At this point, the people experiencing the change are resigned to accepting and taking it on board. Bargaining is an attempt to postpone or delay the change. For example, “can we postpone it until my children have finished University?” This is a time where an organisation needs to help people. For example, to consider the impact that the changes have on individuals, including the need for the organisation to inform people that it has a sympathetic understanding of how the change will affect them.

In a work situation someone might work harder to impress in order to impress and avoid any possible redundancy.

**Depression:** When people realize that bargaining is not going to work the reality of the change sets in. People begin to realise the losses associated with the change. Confusion, sadness and even depression are characterised at this point in the curve.

**Acceptance:** As people begin to accept that fighting the change is not going to make it disappear, their attitude is one of resignation. They then move into the acceptance stage and consider their options. This can be very positive as it drives people to explore for new opportunities.

### **Key principles of managing organisational change**

The UK HSE identifies ten key principles to adopt when managing organisational change:

1. The key issue is that the direct **and indirect** effects of a proposed change on the control of hazards should be identified and assessed.
2. Due to the greater potential consequences of an accident, major accident hazard sites should aim for higher reliability in their planning and decision making.
3. Avoid too many simultaneous changes which may result in inadequate attention to some or all. Phase changes whenever possible.
4. Organisational change should be planned in a thorough, systematic, and realistic way, similar to the processes for managing plant change.
5. Two aspects of the change need risk assessment: risks and opportunities resulting from the change (where you want to get to) and risks arising from the process of change (how you get there).
6. Consult with staff (including contractors) before, during and after the change - don't miss serious issues hidden among all the natural concerns.
7. Ensure that all key tasks and responsibilities are identified and successfully transferred to the new organisation.
8. Provide training and experienced support/supervision for staff with new or changed roles.
9. Consider reviews of plans and assessments by independent internal or external experts - be prepared to challenge.
10. Remember that change can happen even to apparently static organisations e.g., the effects of an ageing workforce.



## Learning outcome

- **8.1:** You will be able to manage contractors and supply chains to ensure compliance with health and safety standards.

## 8.1: Supply chains

### Contractors

#### Selection of contractors

A contractor is anyone an organisation/client brings in to carry out work who is not an employee. Using contractors – for maintenance, repairs, installation, construction, demolition, and many other jobs – is routine in many organisations.

Contractors, like clients, also must comply with national health and safety legislation. Clearly, when contractors are used, the activities of different employers interact. It is imperative, therefore, that responsibilities are clearly defined before work starts. This is usually by way of the agreed, signed contract.

It is therefore vital that when clients go out to tender (often inviting several contractors to tender for a work activity or project) that all relevant health and safety requirements are provide method statements clearly spelt out in the work specification (for example, the need to: provide risk assessments and method statements before work starts, provide any specialist personal protective equipment that might be required for the job, attend health and safety progress meetings, carry out training whilst on site – such as toolbox talks.)

When bids are received, the client should check them against the work specification to make sure that proper provision has been made by the contractor(s) for controlling risks.

#### Pre-qualification and preferred contractor lists

**Pre-qualification:** Contractor prequalification is an information gathering and assessment process. It helps to evaluate a contractor's capability, capacity, resources, management processes, and performance.

In addition to health and safety performance and standards, other areas of interest to a client include financial capacity, work history, licensing and qualifications, the availability of adequate human resources and equipment for the task or project.

Information that a prospective contractor might be asked to provide to assess health and safety performance standards might include:

- Health and safety policy statement
- Risk assessments
- Method statements
- Injury statistics
- Enforcement action taken by regulatory bodies
- Employees health and safety training records
- Membership of trade body or trade association
- Previous experience in similar work or industries
- References from previous clients
- Arrangements for selection of sub-contractors

Pre-qualification questionnaires form the basis of the procurement process and are used by many organisations.

Simply picking up the telephone, particularly for smaller tasks, and selecting the cheapest available contractor can lead to serious issues – both in terms of cost effectiveness and poor standards of health and safety.

**Preferred contractor lists:** It pays clients to build relationships and to set up preferred contractor lists. This can have definite advantages. This leads to familiarity with a client's rules, standards, and expectations – as well as contractor workers becoming familiar with the You can check their safety record from time to time and keep them in touch with your rules and standards. You will have a contractor in place with considered and reliable arrangements for safe working. This can also avoid the need to carry out a complete selection process every time.

### **Contractor accreditation schemes**

Within the Health and Safety supply chain, the selection of contractors is critical. Some organisations make use of “accredited schemes” for contractors (run by independent organisations) which assess the competence of a contractor in key areas, one of which is health and safety standards and performance.

### **Additional requirements when selecting “specialist” contractors**

There will be occasions when a client has to recruit specialists for work which is outside the skill set of the client – for example, a consultant hygienist to carry out hazardous substance monitoring or a noise survey. It is the client's responsibility to ensure that whoever is being considered is competent to carry out the task required of them. Ways to establish this might include:

- Establishing that the specialist is suitably qualified. For example, a hygienist is a member of the British occupational hygiene society (BOHS) or the International occupational hygiene association (IOHA).
- Confirmation that the specialist is governed by a code of professional ethics. For example, the BOHS code of ethics, which all members pledge a commitment to, and which concerns honesty, respect, integrity and avoiding or managing personal conflicts.
- Evidence that the specialist follows a path of “continuing professional development” (CPD). For example, the BOHS administers a CPD scheme for members.
- Evidence that industry standards and best practice are followed. For example, a hygienist using testing services that are approved by a recognised body, such as the United Kingdom Accreditation Service (UKAS).

### **Procedures for ensuring co-ordination between an organisation/client and the contractor**

#### **Information sharing**

It is critical that both parties communicate and share information. Before work starts, the client will need to provide the contractor information in order that the contractor can complete a risk assessment and or a method statement. For example, if a contractor is brought in to carry out demolition work, he will require information such as location of services, residual hazardous substances and even, perhaps, a sequence of demolition.

Once arriving on site contractor workers need to be told about the hazards they face before starting work. Often an induction talk is the best way of passing this information on.

It is worthwhile checking that they have understood any essential points (for example: by having a post induction test).

Contractors have the responsibility to provide appropriate information and training to ensure that their employees have adequate knowledge and skills to perform their jobs safely. The Contractor is generally responsible for

providing safety and job-specific training for its employees unless otherwise stated in the contract or other agreement. Upon final review of the work specification, Client and Contractor may identify any site or job-specific training that is necessary to perform the work safely and agree on how this will be accomplished.

Training that the Client may provide the Contractor's employees include:

- Hazards and risks specific to the installation
- Control measures to control the above risks
- Fire and emergency procedures
- Site rules and Safe systems of work (including Permit to Work systems).
- Accident and near miss reporting systems reporting
- First aid facilities
- Site access requirements (such as “swipe card” or sign in and out procedure)

### **Communication**

It is important that information flows easily between the client and contractor, and also filters down to their respective employees where appropriate.

Contractors need a client site contact – someone to get in touch with on a routine basis or if the job changes and there is any uncertainty about what to do. The site contact acts as a source of help and advice should the contractor encounter problems during the work.

The client contact will also check that the contractor is following both the client health and safety rules and procedures, the controls stated in the contractor risk assessment, accident reporting procedures, together with any active monitoring (such as safety inspection) that the contractor has agreed to carry out. The client contact will usually have a role to play in follow-up from the results of accident investigations or safety inspection issues.

### **End of contract review**

Reviewing is about evaluating the quality of the work against both the job and the contractor's performance. The other reason for reviewing is to learn what will be done differently next time to improve your practice. Review checklists might include the following:

#### **Contractor:**

- Were there any health and safety problems?
- Would you accept them back on site again?
- How good are they at housekeeping?
- Would you give them a reference?
- Do you know enough about them to include them on a preferred list?

#### **Client:**

- How was your planning – was the hazard identification and risk assessment adequate?
- Has the work been done as agreed, for example, as in the contract or in accordance with a safety method statement?
- Has any necessary testing been done, checked, and recorded?
- Were all the permits signed off?
- Have any remaining actions been agreed and considered?

- Is there a record of achievements and shortfalls?
- If the job is likely to be done again in future, is it recorded to assist planning next time?

## Managing health and safety within supply chains

### Introduction

In today's global and national economies, businesses increasingly rely on the outsourcing of parts of their activities and processes. This outsourcing trend and growing importance of supply chains has its implications for the working conditions and health and safety of workers of supplier and contracting companies.

There are two main supply chain relationships between companies and the members of their supply chain: the primary network (a company and its suppliers of certain goods and materials) and the secondary network (a company and its contractors and subcontractors who provide specific services such as maintenance, construction, cleaning, or catering activities).

### Focal Companies

Suppliers' or contractors' chain is most often ruled or governed by one company or organisation, the so-called 'focal' company. In essence those companies that:

- rule and govern the supply chain
- provide direct customer contact.
- Design the product or service offered

Focal companies are responsible for driving up Health and Safety standards across supply chains by setting and requiring minimum health and safety standards from the supply chain.

This is especially the case for brand-owning companies, as they are likely to come under pressure from stakeholders. For example, focal companies such as C&A and H&M were held responsible for occupational health issues at their suppliers in India (Graafland, 2002, Volkskrant, 2010) and Nokia was criticised about the labour conditions in its factories in Asia (Wilde and de Haan, 2006).

Focal companies of supply chains might be held responsible (at least publicly and in the Media) for the environmental and social performance of their suppliers. As a result, focal companies are taking proactive actions to promote better environmental and social, including OSH performance at their suppliers. Hence, the suppliers' chain can have a **positive effect on the working conditions**, safety and health of workers by **promoting OSH** improvements within the suppliers' organisations.

Focal companies may use different strategies to impose OSH requirements to their suppliers. They might include:

- Making clear the consequences of poor OSH performance (such as loss of contract).
- Requiring supplier (and contractors) to work to an accredited standard (such as ISO 45001, ISO 9001).
- Including in contracts arrangements relating for auditing and monitoring – which may result in reduced costs, as organisations will not have to be audited separately by each customer.

### Why Modern Slavery must be managed in Supply Chains

Modern slavery is often a hidden crime involving one person denying another person their freedom. It includes slavery, servitude, forced and compulsory labour and human trafficking.

Whilst there are laws in place across the world which punish instances of modern slavery, governments and businesses could use their extensive buying powers to help mitigate the risks of it occurring in their supply chains by adopting new processes and procedures, in both procurement and supplier management.

Respecting the increasing importance of responsible business practices is integral to when choosing contractors and suppliers to make sure the products and services they deliver are safe and of the highest quality.

Within the Supply Chain modern slavery statements should be at the heart of it and identify areas which require further attention. Policies and processes should be reviewed to assess what changes are needed to comply with modern slavery requirements, in particular mapping supply chains and checking due diligence when appointing suppliers so that concerns and risks can be identified at every point of the supply chain.

### **So where might Modern Slavery be happening in the Supply Chain?**

Understanding the signs of exploitation is the first step in understanding where modern slavery might be happening in the supply chain.

Victims of modern slavery will often try to hide their situation and avoid talking to people out of fear — their employers might have threatened them with physical or mental abuse or made threats against their family members. Employers will disguise modern slavery as legitimate employment to avoid prosecution. So, it can be difficult to identify exploitation and workers may come across victims of slavery every day without realising it.

However, there are a few signs that can indicate unfair treatment of workers, and once you know what to look for, it becomes easier to assess the supply chain for risks of exploitation and take effective action to prevent it.

Lack of supply chain visibility is one of the biggest reasons why modern slavery is an issue in supply chains. Visibility enables better identity to manage supply chain risks in relation to exploitation, for example checking ID, a right to work status and any expiry dates of qualifications or certifications.

Workers at all levels of the supply chain should be made aware of the risks of modern slavery and how to identify the signs of exploitation. Workers must be reassured that they can report suspected modern slavery without fear of reprisal and any internal reporting process should be made clear. In addition, workplace training and education should be provided and be refreshed, updated, and delivered periodically.